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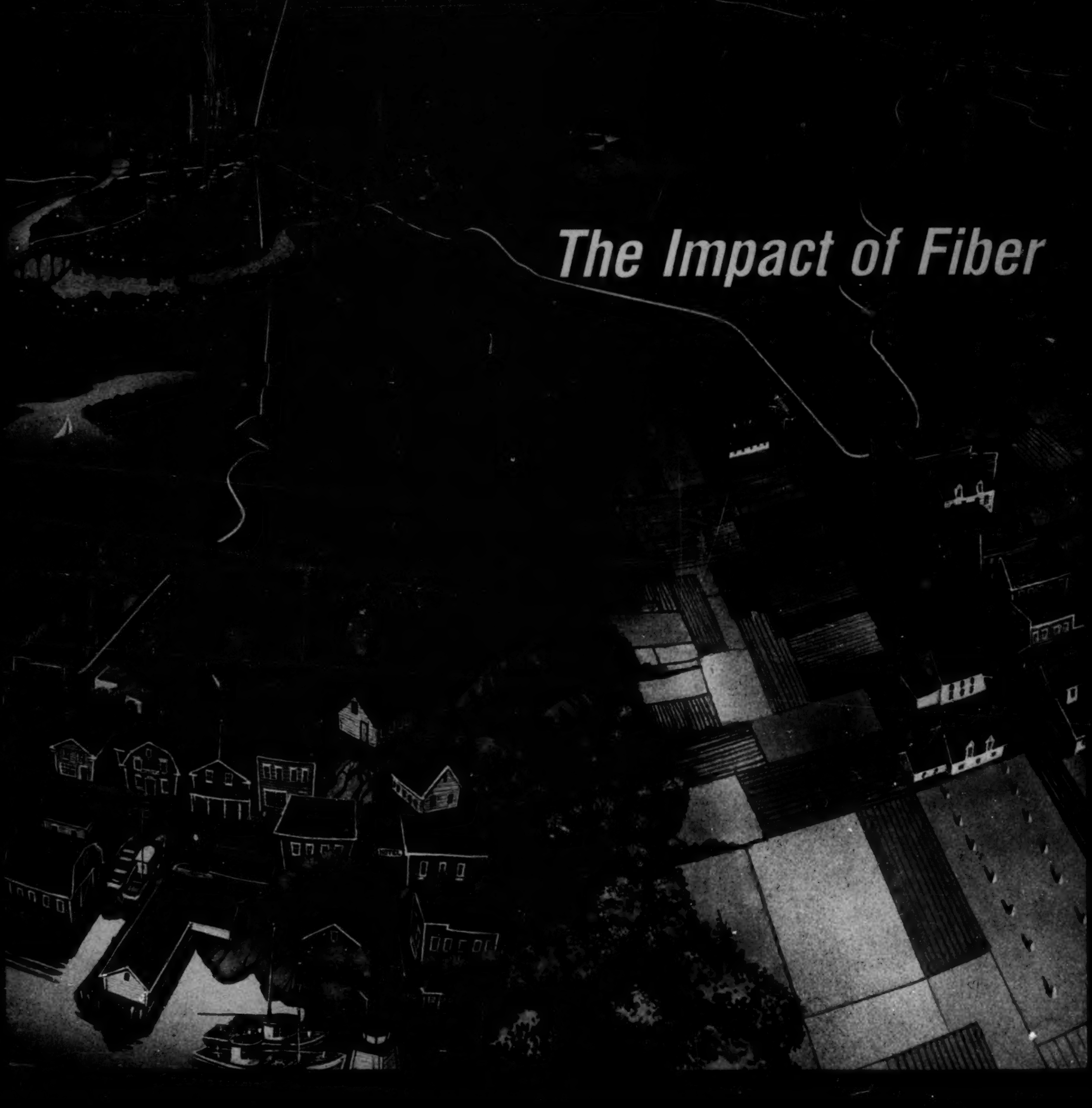
Supplement to Telephony

Telephony's

TRANSMISSION SPECIAL



The Impact of Fiber

Cover art by Brent Lynch,
courtesy of Microtel Ltd.
Inside art by Mike Jones

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A focus on change

A year ago, when *Telephony* produced its first special issue on transmission, we wanted to focus on a segment of the industry that was undergoing dramatic change. Our topic choices were pretty clear-cut—the division between transmission and other industry segments was a fairly easy one to make.

As dramatic change continues within this complex field, however, the once-clear distinctions between the transmission, switching and even customer premises equipment segments are being blurred. I believe our choice of topics for this issue reflects that change.

The driving factor behind this transition remains the ever-expanding capabilities of fiber optics. With single-fiber capacity approaching 2.4 Gb/s, there is both tremendous opportunity and enormous challenge ahead for public network carriers. Managing, protecting, developing and standardizing applications that take advantage of that capacity all loom as major issues.

But, as this issue reflects, there is movement forward on most fronts. The single most significant key is the introduction of the synchronous optical network standard. Progress on SONET standards has been rapid, and some vendors already have SONET-compatible equipment in the market.

SONET promises to offer the ability to manage tremendous fiber capacity more efficiently, and to deliver high-speed services on demand to end users. Business users are already demanding these kinds of services, particularly for networking computers, making fiber to the desktop another trend to watch. Standards for these services are also coming together more quickly than expected.

The Bell regional holding companies are pushing forward on still another key front: Advanced Intelligent Network deployment. Although the long-range plans for AIN have been delayed until the 1993-95 time frame, at least five of the seven RHCs are set to offer targeted AIN-based services by 1991.

Meanwhile the local exchange community is also getting a handle on the technical problems of taking fiber to the home. While the critical stumbling blocks on this front remain ones of national policy, there are also matters of installation, maintenance and powering that must be faced.

A crucial decision on potential network architecture changes in this arena may loom for LECs, and further developments in fiber electronics promise even greater capabilities by the end of the decade.

Once again, we offer a snapshot of an industry undergoing dramatic change. Parts of the picture are in clear focus; others remain much less so.

Carol Wilson

Telephony

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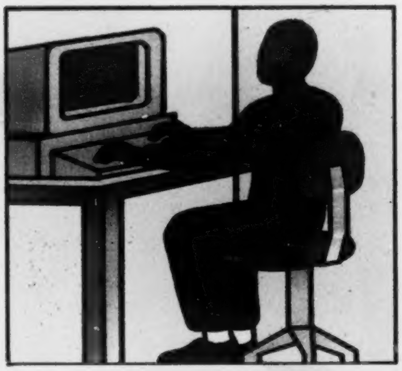
INTERTEC

Fiber to the home: A family affair

Telco trials are getting a lot of hype but they're business as usual for the residents involved. And that's the way telcos want it

DAWN BUSHAUS, *Assistant Editor*
DEBORAH PFEIFFER, *Associate Editor*



A few years ago, the only exposure typical residential telephone users had to fiber optics was through US Sprint television ads, which promoted that company's "pin-drop" quality fiber optic network.

But that fiber now is in the process of traveling directly up to and possibly into their homes, through fiber-to-the-home trials currently in progress (see table on page 31). Are users noticing a difference with fiber phone service? Not really. But that is actually a measure of success.

If these trials are successful, the transmission medium for telephone service and, in some cases, cable TV, will remain a matter of little interest to the customers.

Fiber, Fiber, Everywhere

There is no question that fiber will become ubiquitous in the "last mile," but the issue is when. Southwestern Bell has decided, based on its trials, to offer limited fiber to the home for all new developments by 1992. Other companies are using trials to become familiar with the technology, but have not set any guidelines for widespread availability of fiber.

"I don't expect fiber to the home to take off before 1995," says Mark Lutkowitz, president of TransFormation Inc., a Tulsa, Okla.-based market research firm. "The hardware won't be available before 1995, so most likely it will be between 1995 and 2000." Questions remain about electrical power for services over fiber, backup systems, regulation and standards.

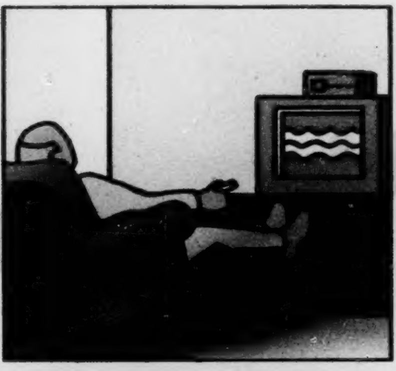
"There is a lot of hype about trials that leads you to think fiber to the home will happen tomorrow," he says. But public utility commissions aren't going to approve the cost of taking fiber to the home until it can be proven-in on POTS alone, he adds, because close to half of the ratepayers won't take advantage of extra services. Since most basic services can still be offered over copper for less money, that's a hard case to make. Telcos are looking for less expensive ways to, among other things, supply an optical interface between fiber and the existing wiring in most houses.

Revised network architectures coming from AT&T and Raynet make the upfront fiber costs less than analog copper within 100 yards of the residence, says John P. Ryan, vice president of Electronicast, a consulting and technology analysis firm in San Mateo, Calif. "The bad news is they didn't get [to the home with fiber], but who cares?" he says. The point, he says, is that the industry is now getting close to the reality of fiber to the home. "Manufacturers and telcos now understand what they have to do to get fiber to the home and make it cost less than copper. That wasn't possible a year ago."

Raynet's system is a fiber-to-the-curb operation, based on a bus architecture (see story on page 40). It is scheduled for a trial in Lynnfield, Mass. AT&T's system uses its SLC Series 5 digital loop carrier in a fiber-to-the-pedestal arrangement being tested by Southwestern Bell in Olathe, Kan.

Bell Atlantic's Experience

Bell Atlantic currently has two technical fiber-to-the-home trials—Bell of Pennsylvania's POTS and video trial in Perryopolis, and New Jersey Bell's Princeton Gate subdivision trial in South Brunswick. Like most of the BOCs' fiber trials, these two were set up primarily to "scope the technical aspects of deploying fiber to the home—the craft, new techniques, new procedures," says Colton O'Donoghue, manager of outside plant engineering for Bell Atlantic. For the Perryopolis trial, fiber runs from the CO to each home. At Princeton Gate, the fiber runs from the CO to remote terminal housings and then to each subscriber's home.



According to O'Donoghue, both

continued on page 31

FIBER-TO-THE-[illegible]

Telco	Announced	Location	Date of service	[illegible]
Alltel	Oct. 89	Piper Glen, N.C.	Dec. 89	[illegible]
Ameritech	Aug. 88	Ohio	n/a	100
Bell of Pa.	June 88	Perryopolis, Pa.	Winter 89	100
Contel	Oct. 87	Ridgecrest, Calif.	1st Q 89	400
Contel	Oct. 87	Sidney, N.Y.	during 89	600
Contel	Early 89	Wyoming, Minn.	end 89	240
GTE	Dec. 86	Cerritos, Calif.	mid 89	700
N.J. Bell	Spring 88	S. Brunswick, N.J.	Aug. 88	100
N.E. Tel	Oct. 88	Lynnfield, Mass.	4th Q 89	100
So. Bell	Sept. 87	Heathrow, Fla.	June 88	500
So. Bell	Fall 87	Hunter's Creek, Fla.	Fall 87	1300
So. Bell	Oct. 88	Governor's Island, N.C.	Spring 89	42
So. Bell	April 89	Coco Plum, Fla.	2nd Q 89	200-[illegible]
So. Bell	May 89	Savannah, Ga.	2nd Q 89	192
So. Bell	May 89	Lake View Terrace, Fla.	June 89	100
S.C. Bell	Early 88	Memphis, Tenn.	Fall 88	300
SW Bell	Fall 87	Leawood, Kan.	Oct. 88	140
SW Bell	Feb. 89	Ft. Worth, Texas	4th Q 89	80
SW Bell	Sept. 89	Olathe, Kan.	Oct. 89	250
U S West	Spring 88	St. Paul, Minn.	1st Q 89	100
U S West	July 88	Scottsdale, Ariz.	Fall 89	96

Fiber *continued*

trials are going smoothly. Bell Atlantic has learned about the hardware and equipment needed and about the work issues for turning up service. In Perryopolis, the Bell regional holding company has learned about building a relationship with a cable TV company, he says.

The South Brunswick trial, which began in August 1988, uses AT&T equipment. Princeton Gate was a new subdivision, which New Jersey Bell fitted with buried plant. The trial currently serves about 70 homes and will probably continue into the next year, since some of the homes are not yet constructed, O'Donoghue says.

The Perryopolis trial, which began in February, now serves approximately 65 customers with POTS and cable television. CATV service is provided from the CO through an agreement with Helicon Cable Co. The site was chosen since the aerial plant on both the telco and cable sides was relatively old and needed replacement. The telco laid fiber over the existing plant. Helicon is pleased with the trial, says O'Donoghue.

The fact that POTS (and cable TV, in the case of Perryopolis) is provided over fiber connected to their home should be transparent to customers in both trials, according to the company. Customers contacted by *Telephony* agreed.

"It's really hard to tell the difference in service," says Susan Szelc, a Perryopolis resident. "The only difference between our telephone service before and now is that before when you dialed, you would hear a clicking sound." Cable TV service is also unchanged, she says.

"What I see is really great. Everything put in is working fine," says Virginia Brooks, another Perryopolis resident.

Bell Atlantic has other trials planned, but can't announce them now, says O'Donoghue. As for a ubiquitous Bell Atlantic fiber-to-the-home network, he says, "It's not going to happen tomorrow." He estimates it will take 20 to 25 years, give or take 50%. Providing the service in Perryopolis has cost the telco an average of $5000 per subscriber, O'Donoghue also estimates.

The Fiber Leader

BellSouth is the most active RHC in trials, with eight POTS fiber-to-the-home trials in progress at Southern Bell and one in Memphis at South Central Bell. But two Southern Bell fiber projects, at Heathrow and Hunter's Creek, Fla., offer more. One important difference, the company stresses, is that these sites represent fiber-to-the-home *service*, not a trial.

Fiber-based POTS was turned up in June 1988 at the new Heathrow subdivision. In November 1988, ISDN over fiber was offered in the residences. Last June, video service was multiplexed on ISDN over the fiber. So far, 100 homes receive the service out of a potential targeted 256 homes. Customers pay for the regular POTS service and will pay for their cable, says Karen Mangum, project manager for BellSouth Services. The company is not yet charging for ISDN services.

"We're getting residents acclimated to using new services and seeing how they work," she says. The provision of residential ISDN service will be confined to Heathrow until the company finds out what customers want.

Heathrow and Hunter's Creek are going well from the POTS standpoint, Mangum notes. "Customers don't know the difference, which is how we want it. Signal quality is good and should be transparent. The video has quite good quality—high 40s and low 50s decibel signal-to-noise ratio—and an outstanding picture."

The telco began offering fiber to the home at the new Hunter's Creek subdivision in November 1986. Res-

continued on page 32

idents receive POTS and cable service over a combined use of single-mode and multimode fiber. One advantage of providing CATV over the telco's fiber is software control of programming, which allows the addition of premium channels without a service call. It also means there is no need for a console device for residents.

As Mangum noted, if residents notice any difference in service, they are pleased with the quality. Bernie Greenwood, a Hunter's Creek resident, doesn't notice any difference in his phone service, but sees considerable improvement in the cable TV service. Picture quality is much better now, he says.

There are some limits to cable, Greenwood notes. Only two cable channels can be provided to any one home, he says. So a third TV set within the home would have to be tuned to the same channel as one of the other two sets.

But Greenwood says he's not complaining, especially since the new service almost never goes out, even during heavy rains. "It would go out [during rainstorms] before. Now it would only go out if we lost complete power," he says.

SWB Pushes On

Southwestern Bell's trial in Leawood, Kan., ended in June. The cost of the project exceeded expectations, says John Coleman, area manager of loop technology and planning, but the technology worked as the company had planned.

"The expenses associated with providing, installing and repairing the fiber were more than we had anticipated," Coleman says. While declining to cite any specific figures, he says the primary expense was labor costs.

Fiber splicing nearly doubled the time it took for installation, Coleman says. An installation job that normally took one to two hours with copper wire became a three-and-a-half to four-hour job with fiber.

"But those prices will begin falling with new and improved splicing techniques," Coleman says.

The Leawood trial involved 100 customers in new homes and tested only POTS. Southwestern Bell is planning two additional trials where construction is under way.

In Olathe, Kan., 250 customers will receive POTS in a fiber-to-the-pedestal trial, and in Fort Worth, Texas, 80 customers will receive POTS and CATV service. Both trials will take place in new subdivisions.

Coleman says Southwestern Bell is planning for at least one more trial to be deployed in the third or fourth quarter of 1990 that will involve existing homes.

GTE California is gearing up for its Cerritos trial, which is expected to involve 700 customers. Services, including voice, data and in some cases, video, should be up and running during the first and second quarters of 1990.

Unlike many other telcos, GTE is not just testing the technology.

"It's a research project. We want to know how to build the network of the future and what services people are going to want. We want to get the customer involved," says Erik Phelps, customer demonstration center administrator for GTE.

GTE also will look for future uses of coax cable during the trial, he says, and the trial will take fiber to existing homes.

"We all think fiber is the way to go," Phelps says. "But the customer may find that there's no difference. We're letting the consumer drive this."

Phelps says GTE plans to meet regularly with customers to gather input about the trial's progress.

Fiber Heats Up Everywhere

While U S West is looking to verify fiber-to-the-home technology in its Mendota Heights, Minn., and Scottsdale, Ariz., trials, it also is touting a unique element of its trials. The company plans to study the effect temperature has on fiber.

"The very warm temperatures are more of a concern," says Jerry Otto, director of facilities engineering for U S West. "Heat is an enemy of electronics. It can cause failure of electrical components. This gives us a good opportunity to bake the fiber in the Arizona sun."

U S West will offer POTS over fiber to about 100 customers in each city. The company is waiting for customers to purchase the new homes to be involved in the trials.

Otto says U S West will consider expanding the service offerings over fiber after the trials get under way. In addition, the company may look into conducting a trial at existing homes during the third or fourth quarter of 1990.

Contel Corp. currently is conducting a trial in Ridgecrest, Calif., where 25 homes are receiving POTS via fiber, and it is planning trials in Sidney, N.Y., and Wyoming, Minn.

Contel is pleased with preliminary results of the Ridgecrest trial, which show that there is little maintenance needed on the fiber, a company spokeswoman says.

Nynex had scheduled the last quarter of this year for the startup of its one-year Lynnfield, Mass., fiber-to-the-home trial. The trial, Nynex's first, will provide POTS using Raynet equipment to 100 homes. But the trial is not on schedule because of the labor strike, according to Joe Gagen, staff director, external affairs. "The trial won't start before the end of the year. We haven't tested the equipment yet," he says.

The prospect of ubiquitous fiber-to-the-home service has many, if not most, telephone companies excited. But despite telco enthusiasm, analysts seem to agree that installation won't happen overnight. Some convincing arguments will have to be made to regulators and, most of all, to customers.

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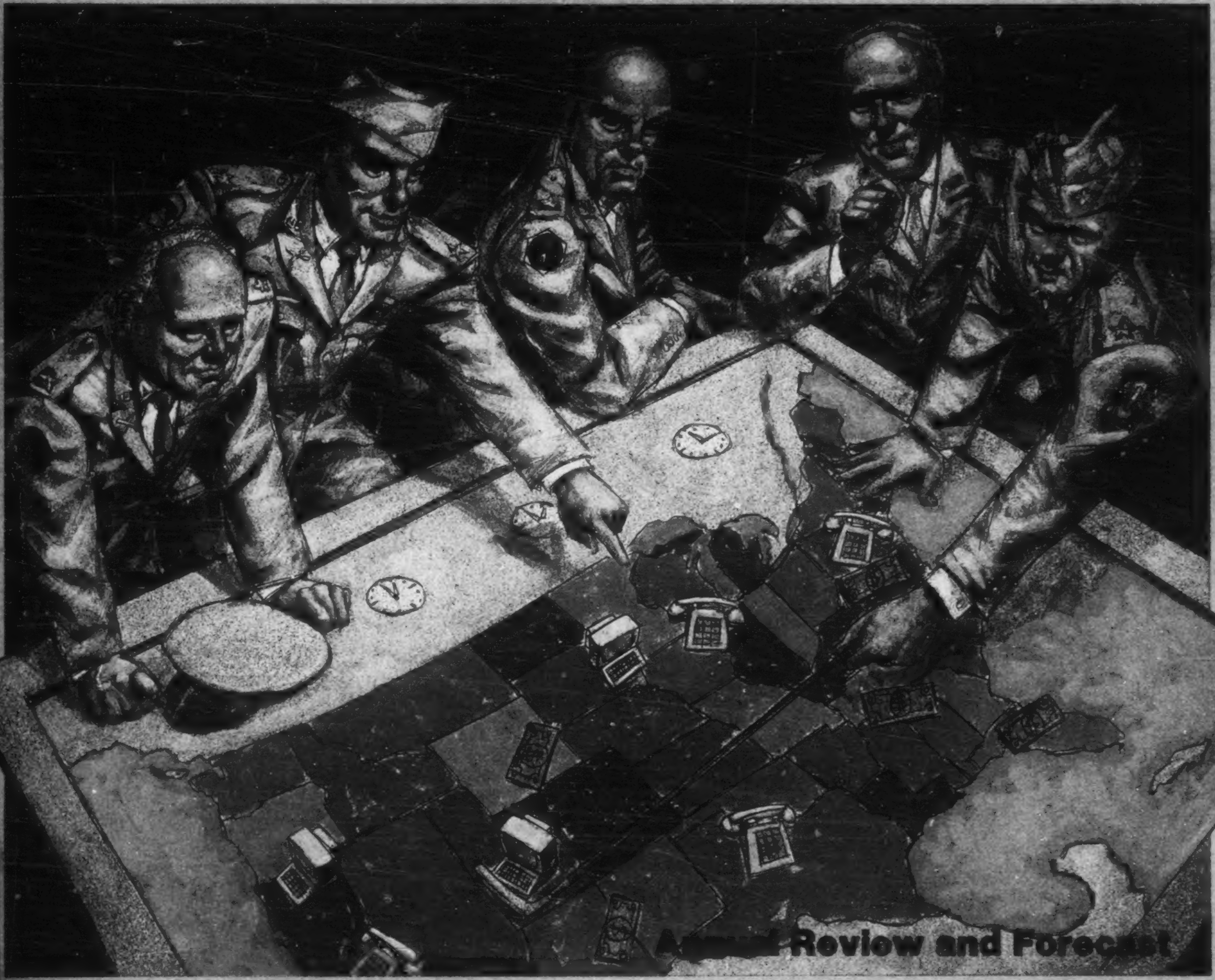


Annual Review and Forecast

SPENDING STRATEGIES FOR THE 1990s

The amount hasn't changed much in the last year, but companies will be spending differently

BOCs OVERCHARGED IXCs, FCC RULES

Both AT&T and MCI can seek refunds and damages

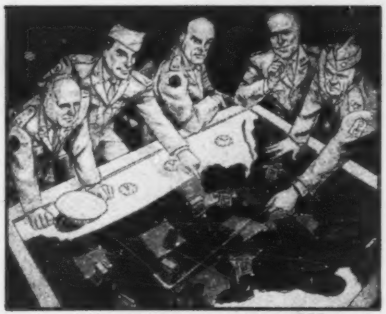
U.S. FIRMS SHARE U.K. PCN LICENSES

Pacific Telesis, U S West and others to offer new service

MONDAY, DECEMBER 18, 1989 Volume 217, No. 26

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS



Telecom leaders are reviewing 1989 results and preparing for the 1990s. Since their pocket change hasn't changed much from last year, LECs and IXCs will be plotting shrewd investments. Cover art by Alan Brunettin

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8 **U.S. COMPANIES SHARE IN U.K. PCN LICENSES**
Three groups awarded licenses to build personal communications networks in the United Kingdom include Pacific Telesis, U S West, Motorola and Millicom

9 **AT&T TRIMS DOWN FOR THE '90s**
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The McCaw-LIN agreement creates a cellular industry giant. BellSouth will receive $66.5 million in fees and expenses resulting from the cancellation of its merger agreement

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In My Opinion

What will 1990 bring?

The passing of a decade is a natural time for reflection. From the telecommunications industry's standpoint, however, it is difficult to sum up the 1980s.

So much happened in this turbulent 10-year period, and the many changes continue to reverberate through the industry. Only last week, the Federal Communications Commission took a landmark position on the basic issue of access charges levied against the interexchange carriers by local exchange carriers (see story on page 8). Those charges are themselves remnants of an era when the goal of universal service outweighed all else. The idea of cost-based pricing was anathema to that goal. In today's competitive market, subsidies and strategic pricing are increasingly inappropriate solutions.

The decade ahead will bring more changes, although it is unlikely that these changes will be as fundamental as the divestiture and deregulation forces of this decade.

Let's take one year at a time. What will 1990 bring to the public network? Here's an opinion—and something of a wish list, really—from one observer.

1990 will be the year that two long overdue technologies—ISDN and SS7—reach the marketplace in a meaningful way.

The integrated services digital network that will blossom will be more limited than originally foreseen, however. As it is tariffed by LECs, and the related customer premises equipment becomes more reasonably priced, ISDN will become a cost-efficient solution for medium-sized and smaller businesses. And while it won't offer the speed and flash of some existing data communications solutions, it eventually will provide a true international standard for voice and data that is within the financial reach of all market segments.

Signaling system 7 and services based on it will finally arrive in the local market, although still on a spotty basis. As automatic number identification-based services spread, LECs will fight more battles and have to devise some creative solutions concerning privacy issues. So far, I'd put my money on GTE Telephone Operations' approach, which provides a caller ID that isn't a telephone number.

Sonet will make a significant appearance in 1990, as Phase I equipment is deployed. Companies such as Bell Atlantic that are aggressively deploying Sonet gear say it already proves-in against existing asynchronous transport technology. If the current and future field trials prove them right, look for many more vendors to move quickly into this market. If, on the other hand, the promised upgrades to Phase II standards prove stickier than expected, look for a market slowdown.

Within the LECs, marketing and technology research will stop being distant cousins. The entire industry should learn from the experience of ISDN and work harder to translate technology into market applications.

The LECs also will attempt to get their operations support systems in shape to support diverse new services and markets.

The Bell regional holding companies will gain additional freedom from the Modified Final Judgment restrictions through congressional action, but will then face regulation by an FCC determined to make them toe the line.

Here at *Telephony*, we will continue to work harder to bring you news and feature material that addresses these and many other issues within this dynamic industry. Of all these predictions, that's the one of which I am most certain.

Happy holidays to all.

Carol Wilson

Telephony

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INTERTEC

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Methodology

The information in this report is based on exclusive primary research conducted by *Telephony's* Market Research Department in October and November.

Each of the Bell operating companies and the top 15 Independents were queried about their network expansion budgets for 1986 to 1991 and the percentage of the 1990 budget that would be spent for equipment in 10 major plant and facilities categories. The local exchange carriers also were asked to report installed lines and local switches, the current distribution of lines and switches by technology, their fiber optic facilities and the percentage of those facilities in aerial, underground and buried plant in the exchange and toll networks. The interexchange carriers were queried only on their 1986-1991 network expansion budgets.

Any estimates that appear in this report have been crosschecked by our Market Research Department against filings by the LECs and IXCs with the Federal Communications Commission, the Securities and Exchange Commission and our Market Research Department database. We believe the estimates to be accurate within 5% of the actual amounts.

Local Exchange Carriers
1986-1991 Network Expansion Budgets $000,000

	1986	1987	1988	1989	1990	1991	Ave 86-87	Ave 88-91
The Regionals								
Ameritech								
Illinois	653.5	590.8	590.7	611.4	620.0	620.0	622.2	610.5
Indiana	234.9	223.5	194.5	192.5	203.9	211.8	229.2	200.7
Michigan	525.0	514.0	485.5	501.0	515.0	520.0	519.5	505.4
Ohio	386.2	388.2	373.8	383.3	402.7	374.4	387.2	383.6
Wisconsin	194.8	165.5	179.7	180.0	180.0	174.1	180.2	178.5
Subtotal	1,994.4	1,882.0	1,824.2	1,868.2	1,921.6	1,900.3	1,938.2	1,878.6
Bell Atlantic*	2,268.0	2,330.0	2,435.0	2,500.0	2,515.0	2,49[illegible]	2,299.0	2,486.3*
BellSouth								
Southern	1,695.6	1,823.5	1,789.4	1,805.1	1,882.6	1,869.1	1,759.6	1,836.6
South Central**	1,121.8	1,125.9	1,142.2	1,179.4	1,162.0	1,038.8	1,123.9	1,130.6
Subtotal	2,817.4	2,949.4	2,931.6	2,984.5	3,044.6	2,907.9	2,883.4	2,967.2
Nynex								
New York*	1,319.0	1,432.0	1,492.1	1,470.0	1,450.0	1,420.0	1,375.5	1,458.0
New England*	739.0	846.0	958.0	940.0	910.0	890.0	792.5	924.5
Subtotal	2,058.0	2,278.0	2,450.1	2,410.0	2,360.0	2,310.0	2,168.0	2,382.5
Pacific Telesis								
Pacific Bell*	1,625.1	1,450.0	1,240.0	1,245.0	1,250.0	1,240.0	1,537.6	1,243.8
Nevada Bell*	16.4	25.6	26.0	26.0	27.0	26.5	21.0	26.4
Subtotal	1,641.5	1,475.6	1,266.0	1,271.0	1,277.0	1,266.5	1,558.6	1,270.1
SW Bell	1,876.0	1,407.0	1,107.0	1,300.0	1,450.0	1,500.0	1,641.5	1.339.3
U S West**	1,684.0	1,646.0	1,816.0	1,824.0	1,900.0	1,900.0	1,665.0	1,860.0
Top 15 Independents								
GTE	2,610.0	2,700.0	2,400.0	2,300.0	2,200.0	2,000.0	2,655.0	2,225,0
United	549.6	645.2	666.3	669.7	694.0	685.0	597.4	678.8
Contel	464.6	490.6	556.0	574.0	602.9	558.5	477.6	572.9
SNET	294.9	387.2	326.6	360.0	365.0	365.0	341.1	354.1
Centel	179.2	196.4	185.7	186.1	194.4	216.9	187.8	195.8
Subtotal	4,098.3	4,419.4	4,134.6	4,089.8	4,056.3	3,825.4	4,258.9	4,026.5
Alltel	167.2	164.3	163.9	180.7	200.7	207.5	165.8	188.2
Cincinnati Bell	79.7	91.2	76.4	144.7	121.4	108.0	85.5	112.6
Puerto Rico**	162.0	220.0	230.0	190.0	160.0	160.0	382.0	185.0
Rochester	83.0	82.6	79.7	86.7	87.1	91.2	82.8	86.2
Century	43.0	54.3	53.0	56.7	49.7	53.0	48.7	53.1
Subtotal	534.9	612.4	603.0	658.8	618.9	619.7	573.7	625.1
TDS	29.8	37.5	43.8	51.3	65.9	50.0	33.7	52.8
Lincoln	27.6	27.4	24.3	35.1	31.2	24.5	27.5	28.8
Pacific Telecom	45.9	40.7	40.3	50.9	57.5	63.7	43.3	53.1
C-TEC	24.9	27.6	27.6	36.1	34.2	35.1	26.3	33.3
Anchorage	33.4	25.9	8.0	9.8	16.8	16.8	29.7	12.9
Subtotal	161.6	159.1	144.0	183.2	205.6	190.1	160.4	180.7
[illegible]								
Regionals	14,339.3	13,968.0	13,829.0	14,157.7	14,468.2	14,279.2	14,153.7	14,183.9
[illegible]	[illegible]	[illegible]	[illegible]	4,931.8	[illegible]	[illegible]	[illegible]	[illegible]
Other Independents	720.2	778.6	731.6	739.8	732.1	695.3	749.4	724.7
[illegible]	[illegible]	[illegible]	19,443.1	19,828.3	[illegible]	[illegible]	[illegible]	[illegible]

Source: Telephony/Market Research
*estimated 1989-91
**estimated 1991

Spending *continued*
optical fiber as the transmission medium of choice in an ever-growing number of applications.

California Gold

How important are the digital CO-based services that seem to hold so much promise for the LECs?

"We have two very dense LATAs in the Los Angeles and San Francisco areas with a large concentration of small businesses and technologically advanced families," says Robert A. Steuernagel, executive director of marketing intelligence and assessment for Pacific Bell. "We could possibly be a $2-billion market for information services and enhanced services by the mid-1990s."

Services involved are both the old—Centrex—and the new—videotex—and a dozen or more in between, including packet switching, data transport, CO-based local and wide area networks, voice mail, voice messaging, call waiting, call forwarding, phone answering, intercom, call transfer, three-way calling and speed calling.

These services bring in extra money for the LECs—big money, judging by Steuernagel's statement. They are dependent on digital or stored program-controlled COs and on substantial ancillary equipment installations in the cases of more complicated services. Little wonder a major objective of the LECs is to complete digitalization of their networks as quickly as possible. Pacific Bell says it is working "to replace every electromechanical switch in the

continued on page 36

Fiber Optic Leaders (June 1989)

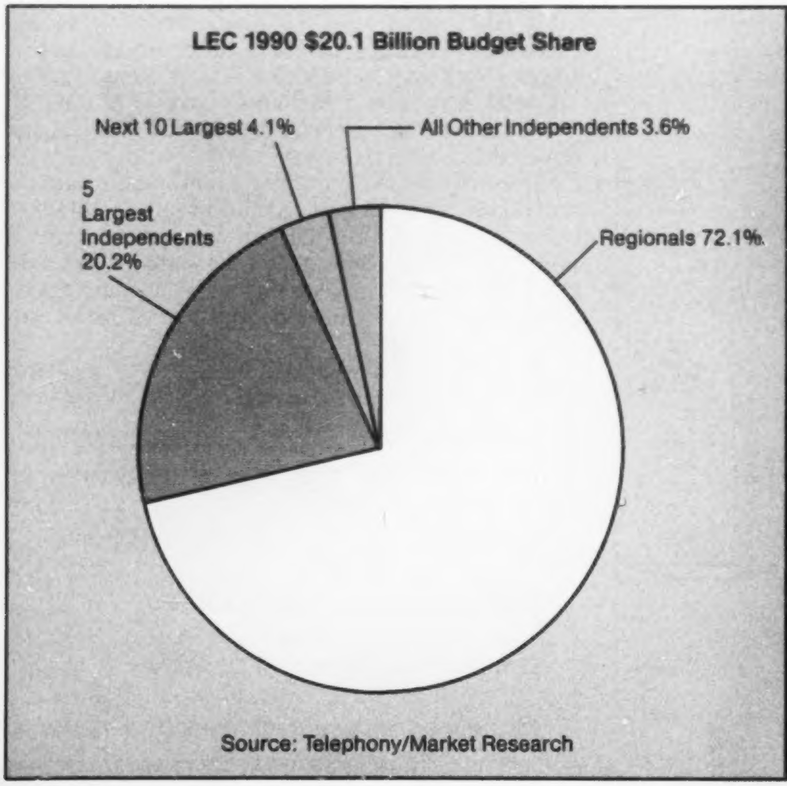
	Fiber Miles	Sheath Miles
BellSouth	386,452	17,826
Bell Atlantic	316,161	10,466
Nynex*	305,000	7,800
SW Bell	237,794	8,100
GTE	227,971•	N/A
Ameritech	195,929	9,273
U S West	163,939	N/A
Pacific Telesis*	110,000	3,500
United	89,212	5,986
Contel	88,000	11,000
SNET	32,145	700
Cincinnati Bell	13,495	306
Centel	9,854	1,285
Alltel	7,584	799
Lincoln	4,266	638
Total	2,187,804	

Source: Telephony/Market Research

*Estimated by Telephony

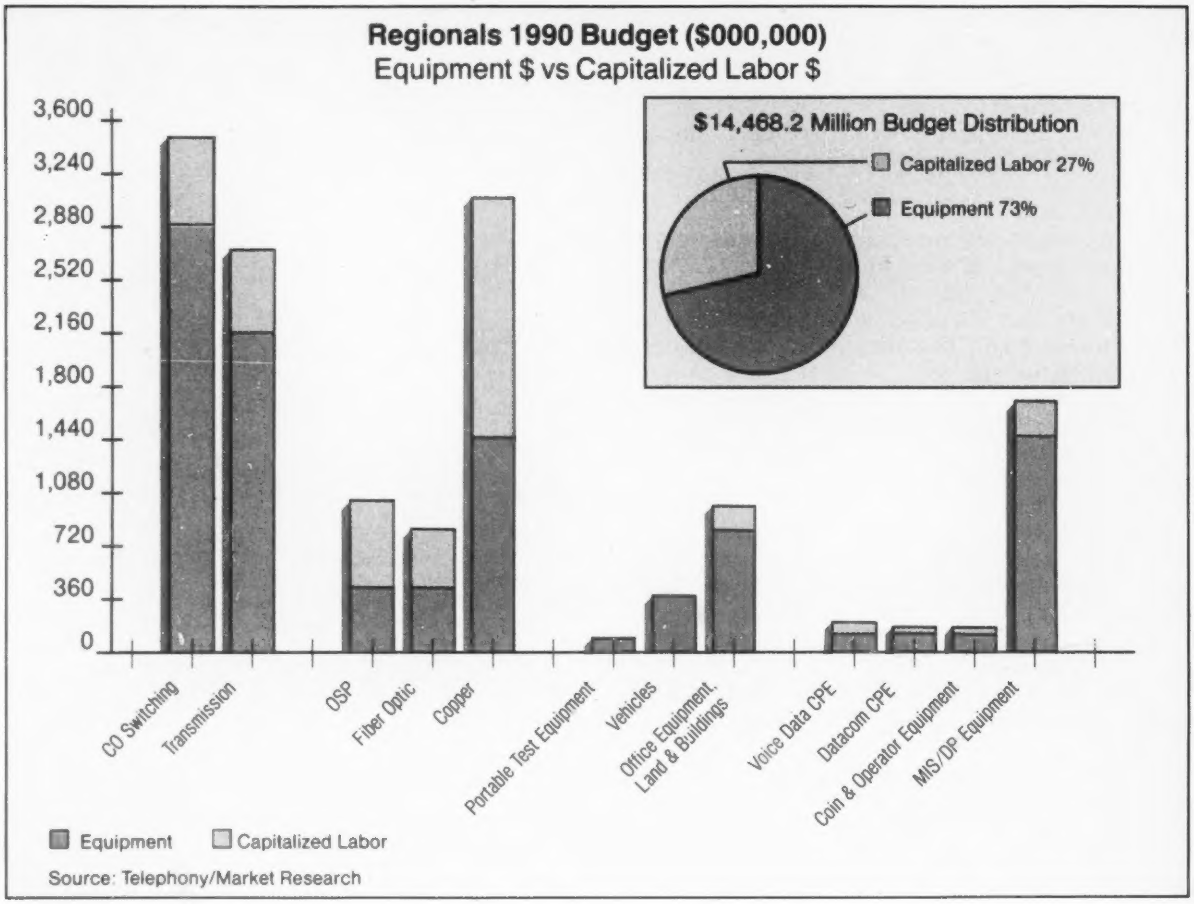
N/A: Not Available

•: Projected Year-End 1989



LEC 1990 $20.1 Billion Budget Share

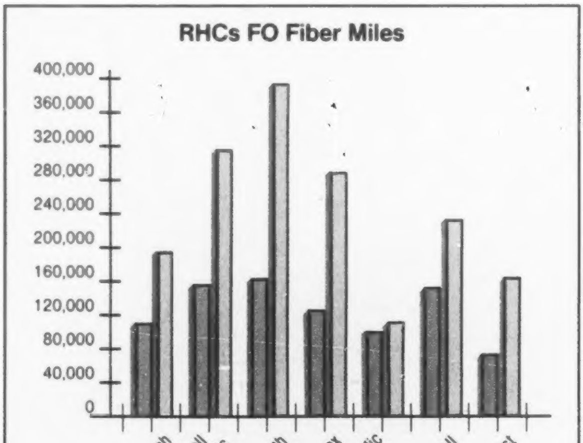
Source: Telephony/Market Research



Source: Telephony/Market Research

Spending *continued*
state by 1991," thus enhancing its opportunity to offer new services to all customers.

And Southern New England Telephone says it is spending $1 million per day to bring new technologies to its switched network.



Year-End 1985 vs Mid-Year 1989

Source: Telephony/Market Research

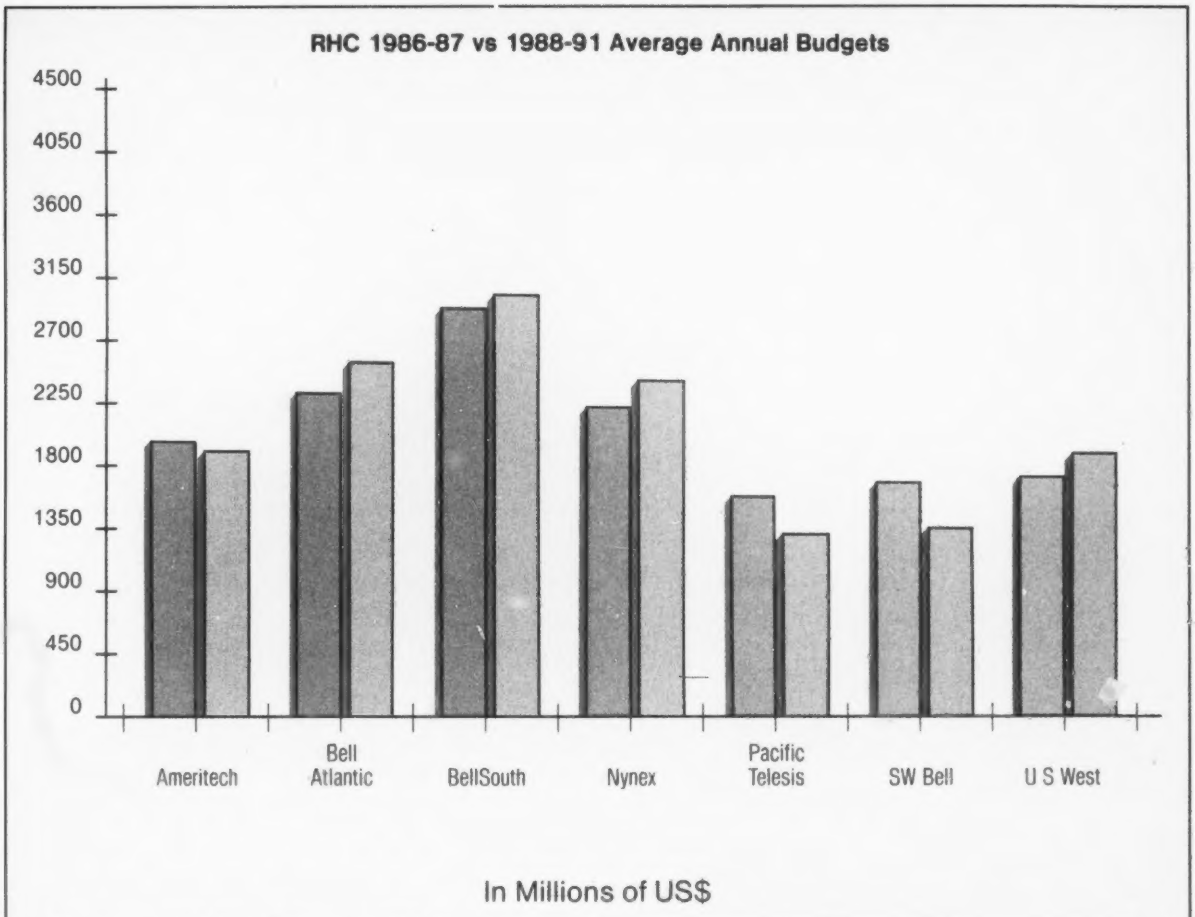
"By the end of 1990, we plan to have software-controlled switches deployed in 132 of our 140 central offices," says SNET Chairman Walter Monteith.

Contel also has ambitious plans, according to James L. Carroll, president of Contel's Telephone Operations Sector.

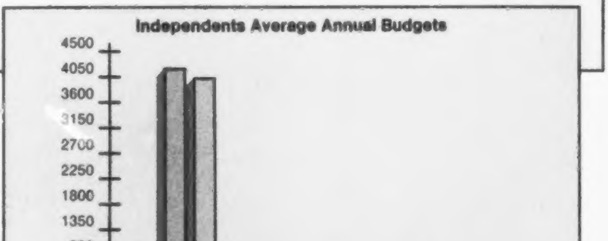
"The company will continue to leverage its extensive digital switching and transmission facilities to bring new capabilities to our customers," Carroll says. "Several locations have been slated for CLASS trials in 1990, and the company will continue a major effort to enable local communities to install enhanced 911 service."

At Ameritech new calling plans are on tap, says Ameritech Chairman William L. Weiss. "We plan to

Fiber, because of its high capacity and superior transmission quality, has come a long way in the past six years. It is clearly the medium of choice for new or replacement interoffice trunks.



▨ Average 1986-87 ☐ Average 1988-91
Source: Telephony/Market Research



▨ Average 1986-87 ☐ Average 1988-91
Source: Telephony/Market Research

introduce new calling plans that will better tailor our high-capacity digital services to customers' needs." he says. "New services such as the Ameritech Service Management system will enable businesses to better manage their communications networks." Ameritech companies also will begin offering a new network automatic call distributor to business customers, according to Weiss.

Goodbye, No. 5 Crossbar

A major milestone for Rochester Telephone Corp. in 1989 was the replacement of the company's last No. 5 crossbar CO switch with a 5ESS digital switch. The event "virtually completed the company's conversion to digital technology in its Rochester territory," says John Purcell, Rochester Tel's vice president-telephone group staff.

Another company that's nearly home as far as digitalization goes is Centel. By year-end Centel projects that 95% of its more than 1.5 million access lines will be digital, according to Sam Leftwich, president of Centel's telephone operating subsidiary.

Centel will offer custom local area signaling services by mid-1990 in Nevada, Illinois and Florida. And voice mail, already offered in all of the company's major markets, also will be offered in several smaller markets that Centel serves.

There are many other indications of the progress in the drive for full digitalization among the major Independents. Alltel, for example, will be 70% digital at the beginning of 1990 and plans to be 90% digital by 1994. Telephone & Data Systems at year-end 1990 will serve more than 80% of its customers with digital switches. Century Telephone Enterprises will have 73% of its switching network digital by the end of 1990 and 91% by 1994. And Commonwealth Telephone Co., a subsidiary of C-Tec Corp., will have its

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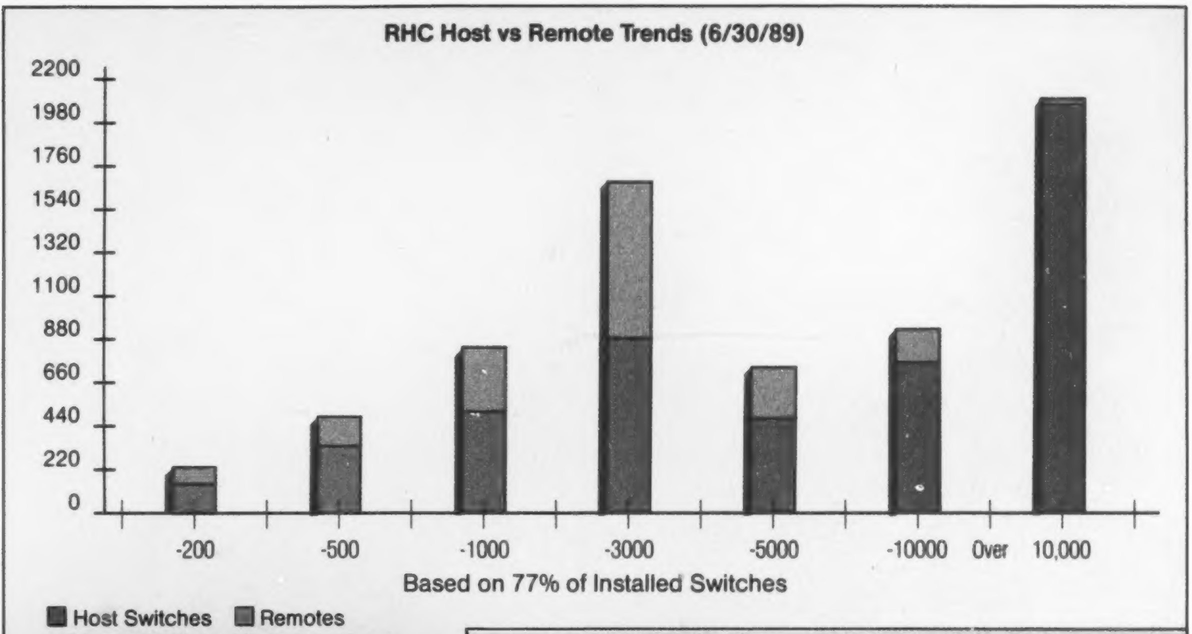
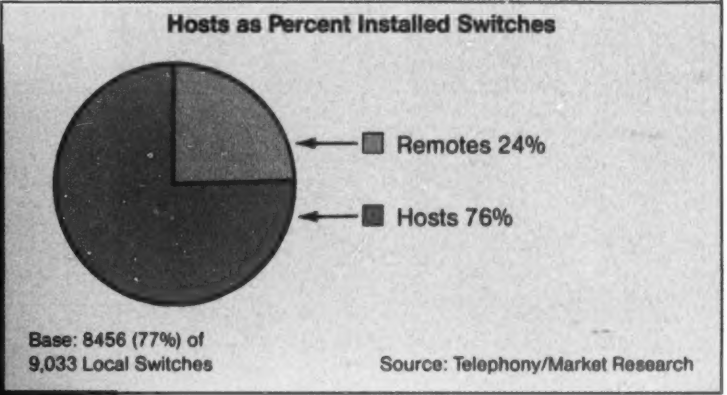
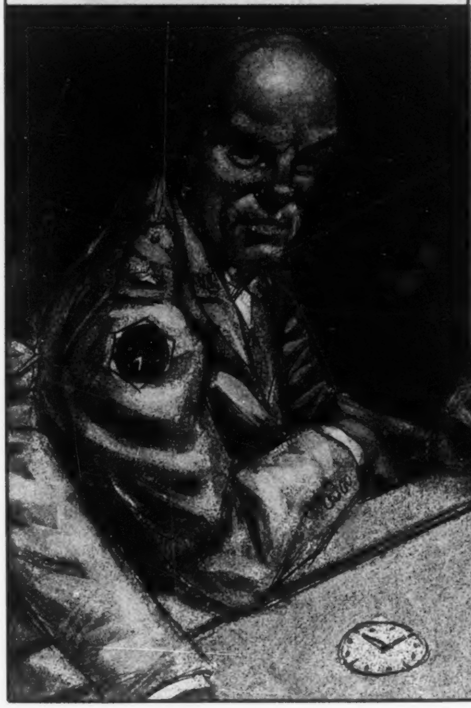


Source: Telephony/Market Research



Base: 8456 (77%) of 9,033 Local Switches

Source: Telephony/Market Research



Spending *continued*
switching network totally converted to digital by 1996.

ISDN for the Masses

There's no doubt that the coming all-digital network will give a big boost to integrated services digital network deployment. But factors other than the gaps in digitalization are inhibiting widespread ISDN deployment. These factors include incompatibility among different vendors' switches and the absence of technical standards.

Despite obstacles, LECs are persistently pushing forward with ISDN. Ameritech (parent company of Illinois Bell, the first LEC to offer tariffed ISDN service) has plans under way for ISDN trials that will cross LATA boundaries and state lines. These trials will involve connection between local service ISDN and an IXC's network, which is another first.

All five of Ameritech's operating companies have been involved in ISDN trials. In addition, the companies "will forge ahead with signaling system 7 and intelligent network deployment plans," says Weiss. "Together they will provide a platform we will use to create and introduce new services more rapidly as we enter the 1990s."

Bell Atlantic's operating companies also have several ISDN trials going. But the company is not "aggressively selling" ISDN because, says Ray Albers, assistant vice president of technology planning, "we simply don't have compatibility across vendors." He's optimistic, however, that the Bell regional holding companies and Bellcore soon will have technical specifications for ISDN. He predicts Bell Atlantic will have its ISDN tariff ready by mid-year and be selling ISDN services in the second half of the year.

BellSouth's Southern Bell subsidiary expects 50

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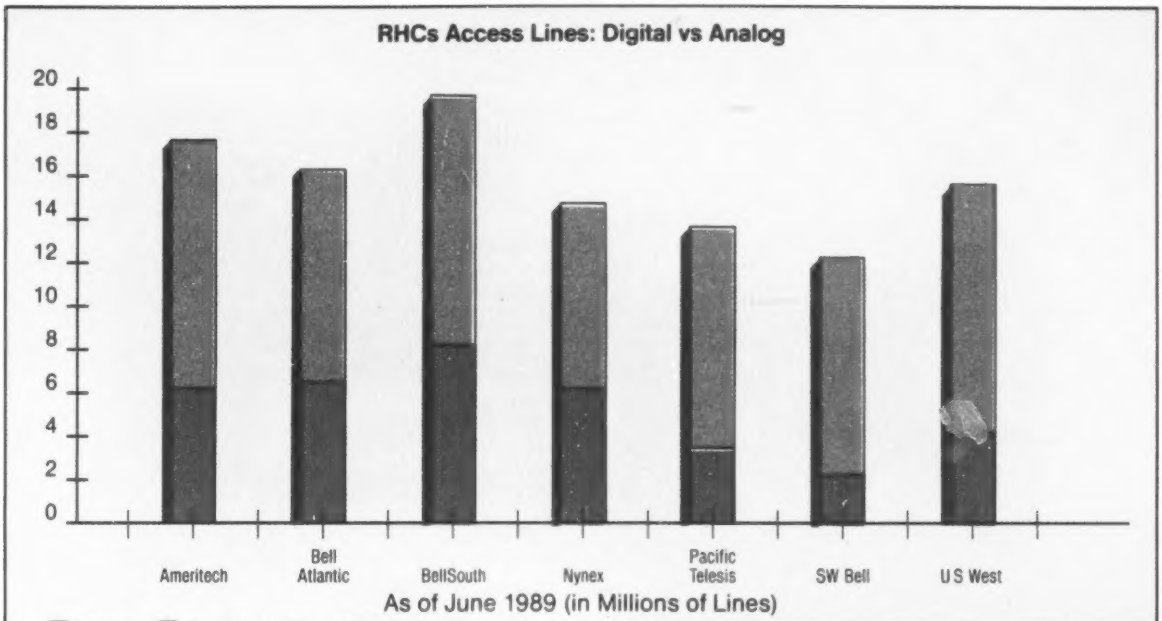

■ Digital ▨ Combined Ess, XB & SXS

Source: Telephony/Market Research

Spending *continued*

COs will be equipped with narrowband ISDN by the end of next year. Those offices were chosen by market research to determine where prospective ISDN users are located.

Southwestern Bell has six customers using ISDN commercially. Four of them must have been easy sales because they are customers who have a strong interest in the growth and success of ISDN: 3M Co.'s Electro-Telecommunications Group, Austin, Texas, with 3165 lines; AT&T Network Systems, St. Louis, with 2300 lines; Rockwell International, Dallas, with

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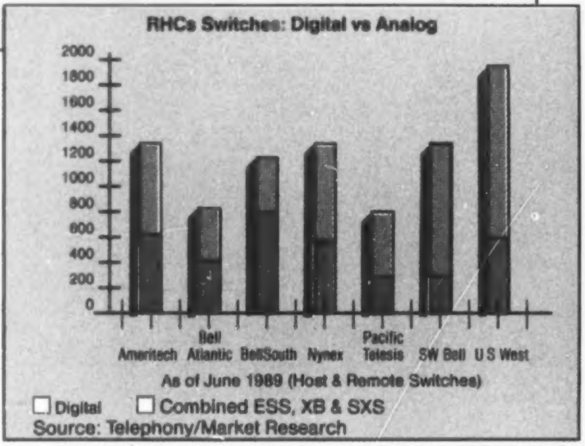

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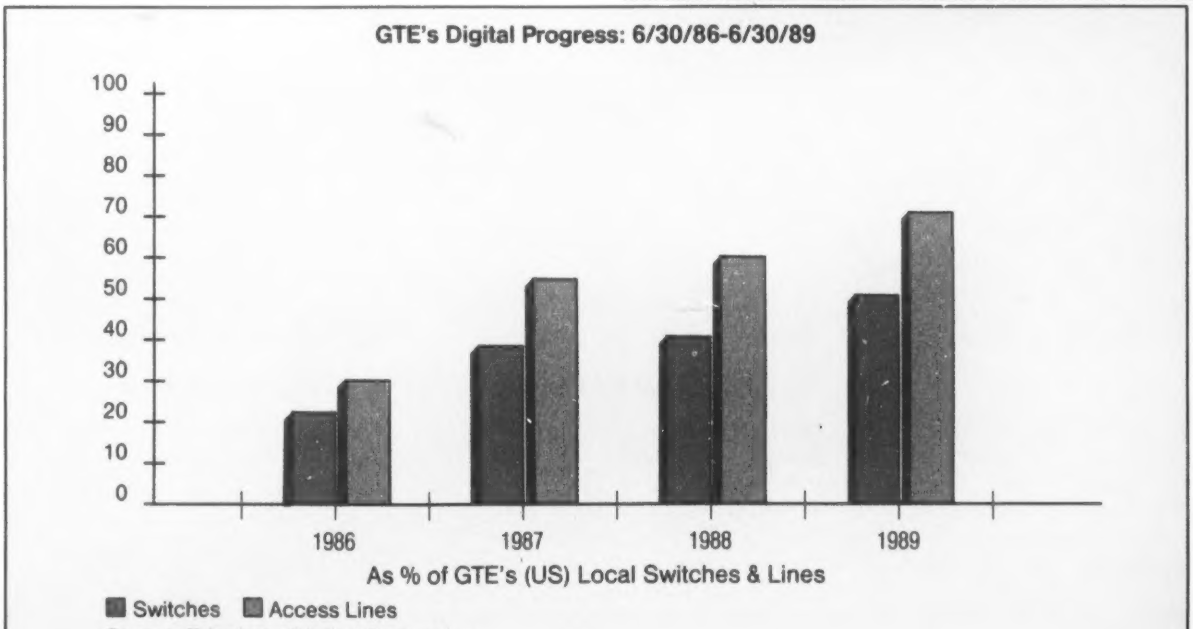
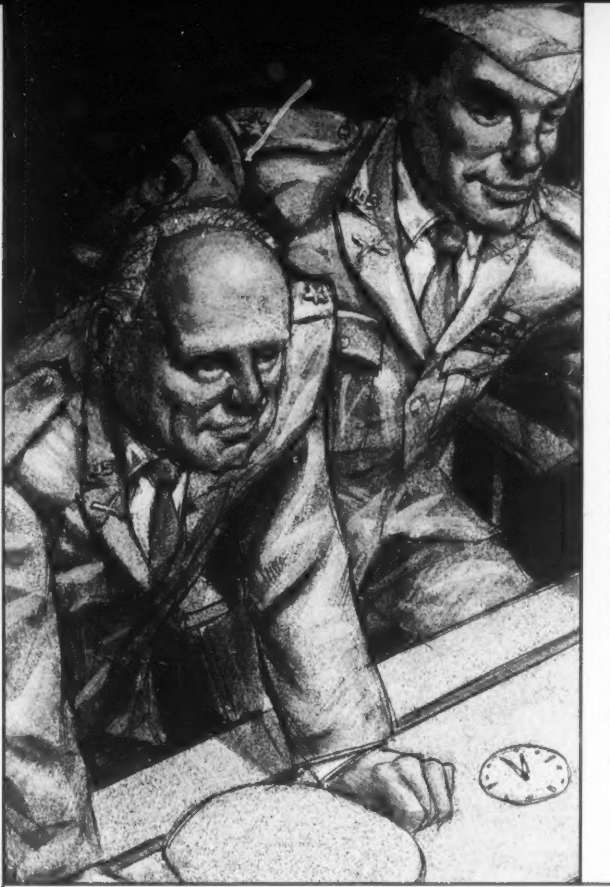


Source: Telephony/Market Research



Spending *continued*

1200 lines; and AT&T Technologies' Oklahoma City Works, with 1000 lines.

Easy sale or not, the company does not "sell" ISDN, says Southwestern Bell's ISDN Project Manager Bill Evans. Instead, it looks at a company's needs and determines whether it can benefit from ISDN's functionality.

The major Independents also are moving forward with ISDN. For example, Rochester Tel is working with customers to determine how ISDN can help them, particularly in data transmission. Because of its virtually 100% digital network, Rochester Tel is well-positioned to make ISDN a reality for anyone who wants it.

Alltel will team with Rochester Tel, Nynex and MCI to link New York City, Rochester and Jamestown, N.Y., in an ISDN trial using SS7 technology.

And Contel has signed a contract for ISDN service with a major food manufacturer and has made ISDN proposals to several financial institutions.

The Fiber Boom

Bell Atlantic is one RHC that is big on fiber. "We are installing fiber in our network at the rate of 100,000

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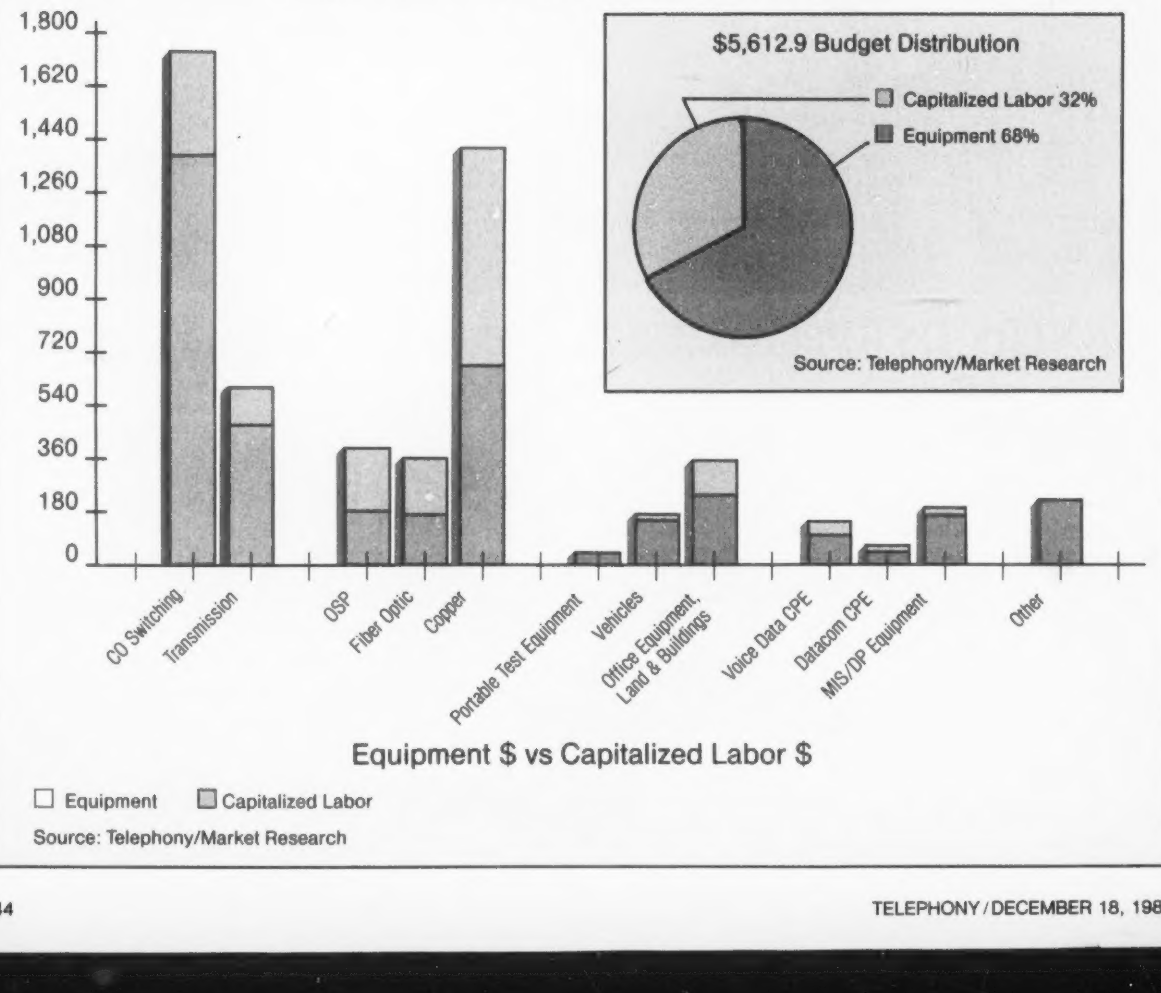
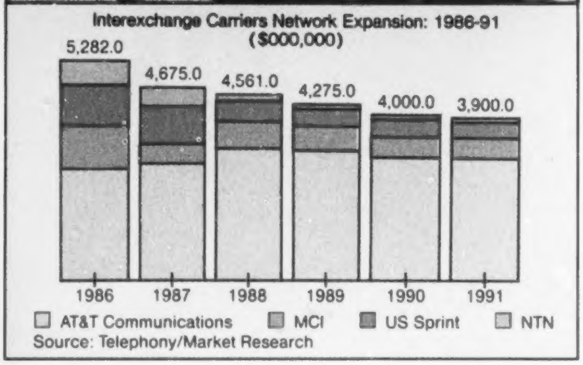
Independent 1990 Equipment Budget $000,000



Source: Telephony/Market Research



Interexchange Carriers Network Expansion: 1986-91 ($000,000)

Source: Telephony/Market Research

Spending *continued*

miles a year," a company spokesman says. "Today, most of that fiber runs to our distribution hubs; by 1992 or so, we believe fiber will replace copper as the connection of choice to new homes and offices. And we envision an all-fiber network, with coherent laser optical switches and end-to-end digital capability early in the next century."

That last vision seems like a long way off, but in reality the next century is only 10 years away. Whether or not Bell Atlantic's vision comes true, there is no doubt that LECs and RHCs are counting on fiber to provide the kind of sophisticated communications that new technology makes possible.

Fiber, because of its high capacity and superior transmission quality, has come a long way in the past six years. It is clearly the medium of choice for new or replacement interoffice trunks. And it is tentatively fingering out toward the ultimate customer in a few dozen fiber-to-the-home trials. Yet LECs still are spending nearly four times as much on copper as they are on fiber, so fiber clearly has not yet come into its own. How quickly it does so depends on how quickly the intelligent network matures and what kind of services LECs will be permitted to provide their customers.

One thing is obvious, though, when comparing spending plans with the achievement goals of the IXCs and LECs this year: Although they will be spending just about the same amount as they did last year, they fully expect to get a lot more for their money. And from the sound of things, they probably will. ■

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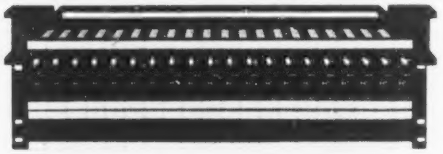

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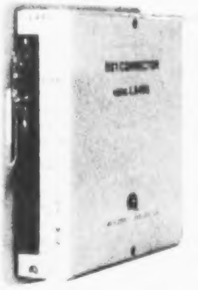

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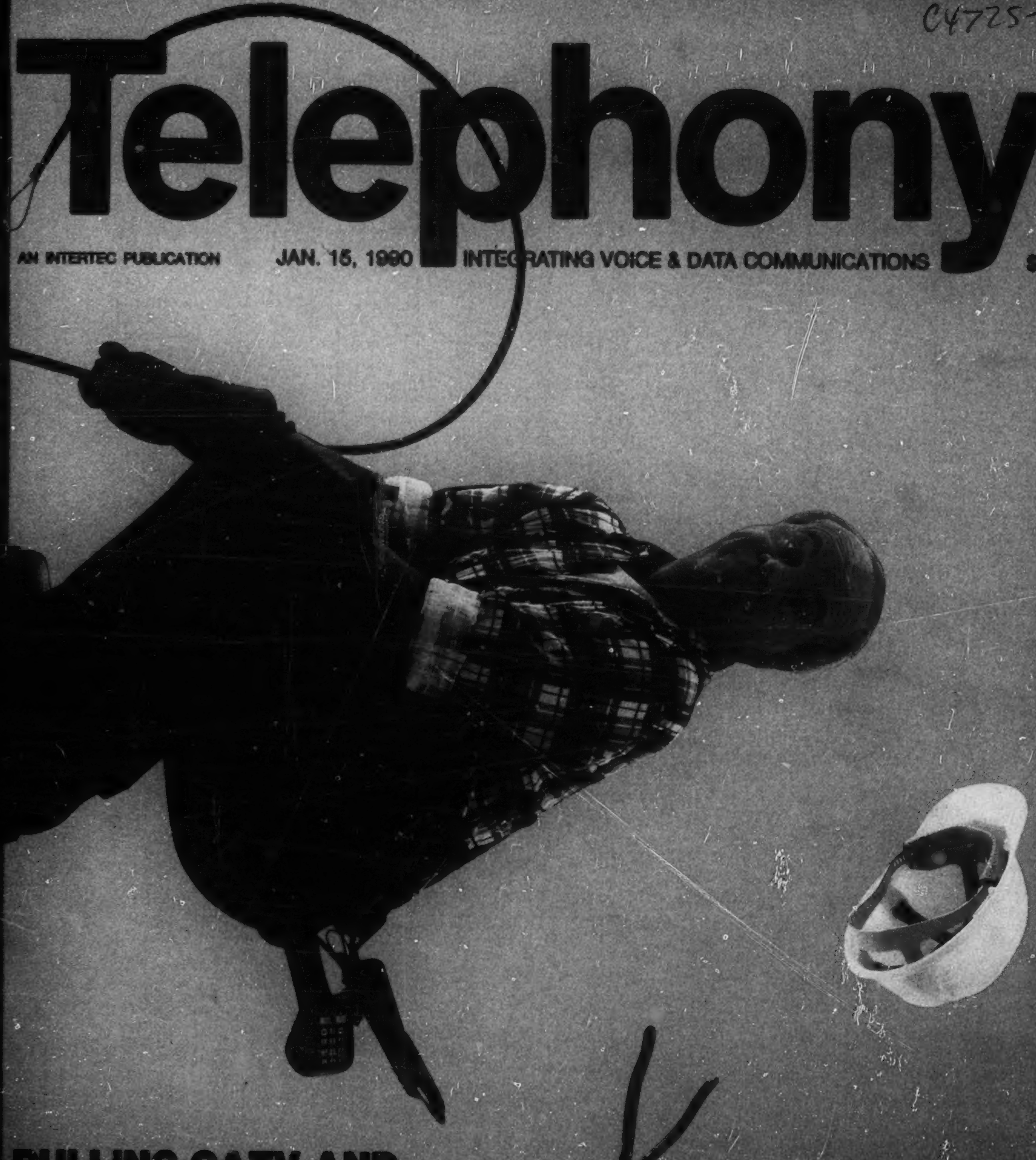

PULLING CATV AND TELCOS TOGETHER

A strategic alliance may be brewing as fiber extends into the local loop

NTIA REVIEWS U.S. TELECOM NEEDS

Results will help develop policies for the 1990s

FCC INVESTIGATES NYNEX SUPPLY UNIT

Agency audit reportedly finds Nynex telcos were overbilled

MONDAY, JANUARY 15, 1990 Volume 218, No. 3

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS

Hold on to your hat! A sense of humor could be helpful in weathering all the toils and spoils of expanding fiber into the local loop and on to the home during the 1990s. Cover photo by Reid Miles, courtesy of Corning Inc.

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The results of the year-long study will be used to develop federal government policies for improving the nation's telecommunications infrastructure

8 FCC INVESTIGATES NYNEX SUPPLY SUBSIDIARY
The agency audit, which is nearing completion, reportedly finds that Nynex telcos were overbilled by Nynex Materiel Enterprises

9 TELECOM*USA, ALC AGREE TO MERGE
Financially troubled ALC will become the third regional operating unit of Telecom*USA in a deal valued at $140 million in cash and stock

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In My Opinion

No surprise here

When I started covering telecommunications in 1985, two of the biggest issues were the coming of the integrated services digital network and the threat of bypass of local exchange carriers.

How little things have changed.

This is the year that ISDN is supposed to really begin reaching the market. This also is the year that the bypass threat comes home to roost.

As we have chronicled in the pages of *Telephony* for some time, there is a burgeoning industry of fiber optic network companies in the nation's largest cities that are eager to siphon off big business traffic from the LECs. As Robert Murray of Strategic Planning Associates pointed out in last week's issue (page 32), local access will indeed be the battleground for the 1990s. And the new upstarts bring a sizable arsenal onto the field: newer networks, total fiber systems, lower overhead and the ability to more rapidly provide service. Unencumbered by the LECs' universal service requirements, bypassers can provide high-quality local service to the cream of the customer crop at competitive prices.

A recent *Wall Street Journal* article chronicled the success of companies such as Metropolitan Fiber Systems and Teleport, listing the major accounts those companies have lured away from the Bell companies.

Where the *Journal* piece went astray, however, was in reporting that bypass networks have come as a surprise to the telephone industry. If anyone should be surprised it should be the politicians, regulators and consumer groups who have argued for the past five years that the bypass threat is a figment of the telephone industry's imagination. These are the same folks who prefer to keep LEC rates dependent on long-distance access charges by resisting efforts to move local rates closer to the cost of providing service.

Critics should begin to see now, however, that the economies of the marketplace will eventually work against residential ratepayers. Creating a situation in which it makes economic sense for large businesses to leave the public network will increase the cost of network maintenance for the rest of us. Furthermore, slowing the pace of public network modernization, as some state regulators wish to do in the interest of keeping rates down, will only hasten the migration of businesses.

Set against this backdrop, the challenge for LECs is clear, but difficult. First, they must work to bring their own costs in line, as many LECs are doing. Most of the seven Bell regional holding companies, for example, are currently in some phase of staff reduction. Pacific Bell most recently announced that it will cut 12,000 jobs *(Telephony, Jan. 8, page 3)*.

Then they must make a more convincing case before state regulators for the kind of rate reform that will facilitate greater investment in network modernization. They must be willing to move more quickly to embrace new technology where it can help meet user needs and offer cost efficiencies. And they must work harder to develop the marketing skills necessary to survive in a competitive market.

Those regulators, on the other hand, cannot continue to take the health of the public network for granted. While they must remain sensitive to consumer needs, lower rates cannot be the overriding concern.

Difficult decisions loom ahead, as do many uncertainties. But one thing is certain: If considerable action isn't taken, the discussion five years from now won't be about the threat of bypass. It will be about how bypass decimated the public telephone network.

Carol Wilson

Telephony

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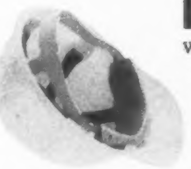
INTERTEC

Pulling cable TV and telcos together

CATV companies and the Bell regional holding companies may be laying down their weapons and embracing each other.

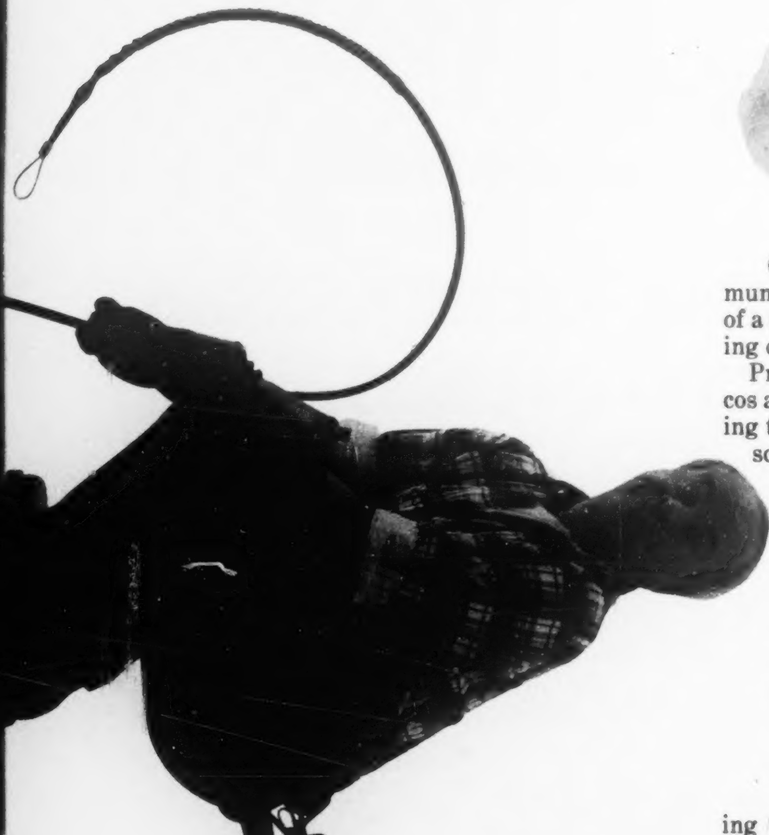
But is it a strategic alliance or tactical maneuver?

MICHAEL WARR, Technical Editor



It seems these days that everyone has a different opinion on whether or not some kind of strategic alliance or unification is good for the general public. In the world of politics millions are wondering whether or not the world can survive the reunification of East Germany and West Germany. In the less dramatic world of telecommunications some people are debating the viability of a strategic alliance between the Bell regional holding companies and cable television providers.

Proof that a marriage of convenience between telcos and CATV companies is a matter worth considering these days was provided at the Fiber in the Subscriber Loop ComForum in Orlando, Fla., last December. An entire session was dedicated to "CATV-Telco Strategic Relationships."



Behind the trend toward these strategic relationships is a number of different factors. Developers are strongly encouraging CATV/telco cooperation to hasten the deployment of high-tech fiber networks in their construction projects. Telcos and CATV companies see an increasing overlap of services that their networks can provide. Both are heading toward more interactive types of services and diversification. Both are installing fiber networks.

"This trend is based on the assumption that video traffic to the home is a major network driver. There is an overlapping and merging of interests and activity in video," says Ray McDevitt, associate director, fiber to the subscriber program for Alcatel. "Both

industries have to be wondering how this all fits together in their five- to 10-year plans."

CATV companies are also under the gun. Congress is considering reregulating the industry, and the Federal Communications Commission has opened a notice of inquiry into the CATV provider's service performance. For CATV companies, the growing dissatisfaction with cable is a major impetus in the search for cooperation.

In the eyes of Congress, "CATV companies are at an all-time low as a corporate citizen," according to Roy Neel, an aide to Sen. Al Gore, D-Tenn. Neel claims that thousands of letters are being mailed daily to Congress complaining about CATV companies' inadequate services and exorbitant price increases. In Boston, for instance, the basic fee increased 698% between 1986 and 1989.

Neel sees the experience and reputation that telcos have for rapid service response and the reliability of their networks as a competitive answer to CATV companies' bad record for outages and slow responses to customer service demands. "No CATV operator has ever expressed desire to provide universal services. The inability of telephone companies to be in cable has slowed down the availability of services," he argues.

Clearly, the telcos are encouraged by cable TV's dilemma and are seeking to take advantage of it.

"We have the expertise and the fiber facilities, and from [CATV companies'] point of view we offer an opportunity to gain experience in fiber technology," says Curtis Williams, director of strategic marketing at Southwestern Bell. "What we are able to do for the CATV companies relates to the quality of transport and response. CATV companies have an understanding of the marketing of programming."

John Coleman, area manager loop technology planning at Southwestern Bell, goes a step further.

"We have not been in the video transport business to individual subscribers, and this is an opportunity to learn more about the technology and what it takes to be in that business," he says.

But Christopher Coles, director of strategic alliance management at U S West, thinks it's a little more complicated than that.

"The telephone industry is in danger of selling the cable companies' technical expertise short. The systems they have constructed in the past are not representative of what they will construct in the future," says Coles. "It's a little arrogant to think we have the superior answer to what they are trying to deliver. We can learn a great deal about their ability to deliver broadcast signals from point to multipoint. To say that we can learn about programming from them is to suggest that we are interested in getting into that business, when what we want to do is cooperate to build a network capable of supporting their business and ours."

Still, some regulators look askance at this evolving relationship between the telcos and CATV companies.

"Will these strategic alliances result in increased competition or reduced competition with a shared monopoly?" asks one FCC official, who asked not to be named. "I get a little nervous when I hear of two monopolies, one of them a de facto monopoly, talking about an alliance. You have to ask, 'Will the public benefit?'

"Strategic alliances that increase competition could prove to be in the public interest," he says. "If a second cable company could lease transmission from the telco and compete with the existing cable company, that would be in the public interest."

Eli Noam, commissioner at the New York Public Service Commission, and a ComForum panelist, agrees. "To the extent that cooperation reduces the chance of competition, it becomes a sort of collaboration that may not be in the public interest. I'd rather see them compete.

"There may be instances in trials and in evaluation of technology where it makes sense to the extent that a telco provides transmission, goes to a cable

> *Telcos and CATV companies see an increasing overlap of services that their networks can provide.*

continued on page 42

Pulling Together *continued*

company and says 'you provide content,'" Noam says. "I would be troubled that such an arrangement would be exclusive in anything but a trial. Only one cable company would have access to that fiber optic [system]. That would lead to a change in the traditional common carrier role of the telephone company, which provides service to anybody who pays the going rate, instead of giving exclusive access."

Marriage On Trial

Joint CATV/telco trials are indeed going on in fiber-to-the-home projects. Southern Bell's Hunter's Creek, Fla., trial started in November 1986 and will include a total of 251 homes. Southern Bell also provides CATV transport at Heathrow, Fla., a trial that started in June 1988 and will eventually reach 4000 homes. Bell of Pennsylvania started its Perryopolis trial in January 1989 serving 100 homes. GTE also transports CATV in Cerritos, Calif., where it plans to eventually serve 5000 homes. GTE's CATV trial is different from the others, however, because it partially owns the cable company.

The latest CATV/telco collaboration was announced at ComForum by Southwestern Bell Telephone and Sammons Communications Inc. The location is Mira Vista, a community in Fort Worth, Texas.

Although it took some of the earlier CATV/telco trials more than a year to get FCC clearance of their 214 petitions, which basically state that the CATV company is a willing participant, it took Southwestern Bell three months. That time frame is an improvement, but still longer than most CATV companies are willing to wait, according to Coleman at Southwestern Bell.

The Mira Vista trial will be the first to integrate video and POTS over single-mode fiber, says Coleman. It will serve nearly 100 homes.

American Lightwave Systems' FT 1300 super trunking system is a major component of the Mira Vista network. The receive end of the FT 1300 is located in a controlled environment vault in the Mira Vista subdivision and the transmit end is located in Sammons' headend building in the south-central portion of Fort Worth.

The FT 1300 picks up the baseband 4.5-MH.z audio signal from Sammons, converts it to an FM optical signal and transmits it optically downstream over single-mode fiber, putting 29 channels on each of two fibers for a total of 58 channels.

The system also includes an American Lightwave Systems broadband switching system 3, which resides in Southwestern Bell's CEV. This is an analog FM broadband switch that picks up the 58 channels and enables any four of those signals to be simultaneously selected by the residential customer. Before these signals get to the customer's set-top unit, however, they pass through an optical network interface on the side of the customer's house, where they are converted from optical to electrical signals.

As of early January this system was not yet operating on a multiresidential basis. Although there is a software problem that needs to be resolved, it is not expected to hold up the trial, according to Coleman. The problem is that the ALS system provides a standard interface to the CATV billing system, but Sammons does not use the typical billing system. The two companies are developing a working interface.

Otherwise, all the basic equipment is available,

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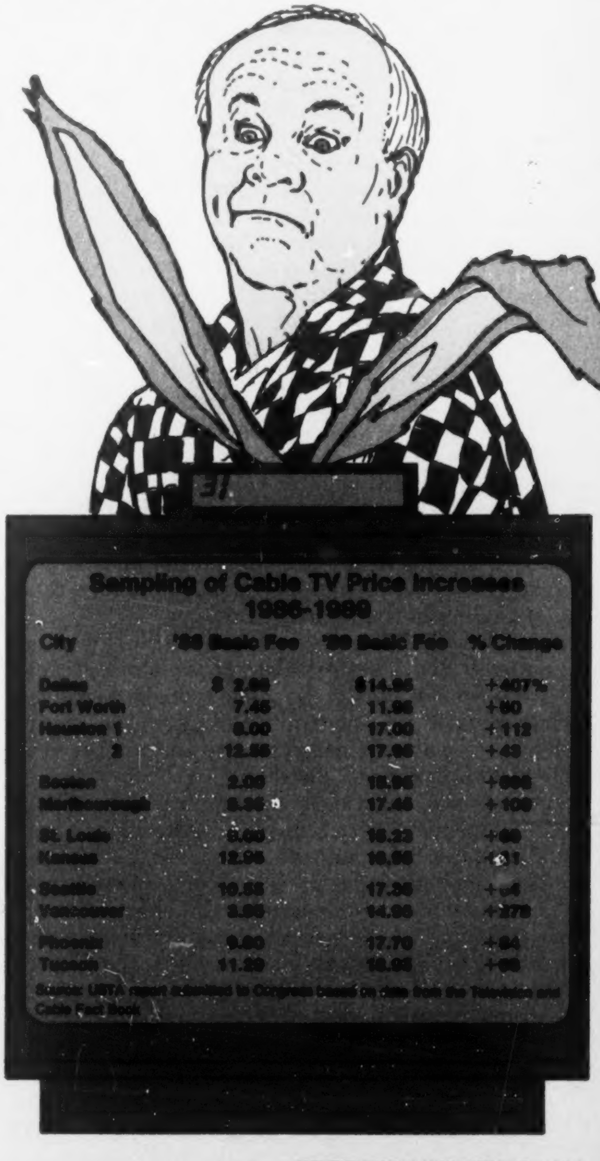
Some skeptics see the relationship between CATV companies and telcos as a fling that ultimately will end in one or the other dominating the cable industry.



Sampling of Cable TV Price Increases
1986-1989

City	'86 Basic Fee	'89 Basic Fee	% Change
Dallas	$ 2.95	$14.95	+407%
Fort Worth	7.45	11.95	+60
Houston 1	8.00	17.00	+112
2	12.55	17.95	+43
Boston	2.00	15.95	+698
Marlborough	8.36	17.45	+108
St. Louis	8.00	15.23	+90
Kansas	12.95	16.95	+31
Seattle	10.55	17.35	+64
Vancouver	3.95	14.95	+278
Phoenix	9.60	17.70	+84
Tucson	11.29	18.95	+68

Source: USTA report submitted to Congress based on data from the Television and Cable Fact Book

Pulling Together *continued*

including the standard set-top unit used for descrambling signals. But there are problems with the converter box that sits on top of many television sets throughout the country today.

To Convert, Or Not To Convert

Robert Saunders, director of engineering at Sammons, expresses the need to remove the converter because of limitations it imposes on television and VCR features, an industrywide problem.

"Anytime you put a box of some type between all signals available on a system and the customer's receiver you place some limitations on the capability of the receiver. When it's limited to four channels, you take away from the customer. Picture-in-picture features, for instance, are not compatible," explains Saunders.

Southwestern Bell also is concerned with this problem.

"With cable-ready TV and picture-in-picture being more prevalent, we need to get away from a set-top unit architecture because it limits the capabilities of the television. If you have a TV with picture-in-picture and a VCR, you would require three set-top units. Most people don't want three units on top of their TV. Along with the CATV companies, we have to come up with a video trap system that eliminates the set-top unit or provides a set-top unit that has multiple outputs," says Coleman.

Saunders would not comment on the development of a new set-top unit, but some manufacturers are working on a prototype.

"Most marketing studies show that the buyer rate for interactive systems where the user walks to the set-top box and pushes a button is higher than that for calling a number. It's a Catch-22," notes Alcatel's McDevitt. "You want to get rid of the boxes but you need interactivity. We believe there will be a new unit that allows broadcast channels but also offers interactive ability."

McDevitt envisions a network that will have a set-top box that is not a converter. The cable would still go into the box but so would the VCR, allowing both convenient use of the VCR and interactivity. This box would not have to tune through all the incoming channels. Alcatel is working on a new set-top box, according to McDevitt.

We Can Work It Out

The CATV network and the telco network, despite their recent relationships, have distinct characteristics. And if the relationship is to be long term, these differences will have to be ironed out.

"There are problems with different architectures," says Coles at U S West. "We are looking at architectural alternatives because the requirements will be different for a long time. CATV architecture is point to multipoint and ours is point to point. We have to integrate those two requirements."

McDevitt sees both industries moving toward a "classic telephone" network. "The classic CATV architecture was a tree and branch," he says. "By putting fiber into the transport trunk instead of one tree, there are now a lot of trees feeding, like a star, into multiple points. So the change is more toward a star architecture."

Even with all the differences, telco, CATV and manufacturing officials believe collaboration is possible with a few adjustments. Meanwhile, the FCC has opened a notice of inquiry on the CATV industry's performance based on the Cable Act of 1984, which virtually deregulated cable television. The report will be given to Congress in July. Although the inquiry will not directly address the cable/telco cross-ownership issue, the FCC will consider whether the act should be amended to allow two or more competing cable systems in each community. Some telcos want to be that competitor.

But regulators don't expect dramatic change.

"If I were a betting person, I'd say we will not see repeal of cross-ownership laws," the FCC official predicts. "But there will be movement to facilitate telco transmission of other parties' content and telco broadband distribution for competition against incumbent CATV companies. There will be some sort of repeal, but not a full repeal."

Some skeptics see the relationship between CATV companies and telcos as a fling that ultimately will end in one or the other dominating the cable industry. Sammons' Saunders expresses the CATV companies' concern: "If the telephone companies want to be in the CATV business, we have a problem. If they want to be in the transport business, they should say that."

Even as Sammons develops a joint trial with Southwestern Bell, Saunders thinks it is too soon to determine which business the telco ultimately wants to be in.

There are also optimists, like McDevitt at Alcatel. "While there is always a need for sabre rattling, in reality the prudent businessmen will prevail. One is not going to blow the other away."

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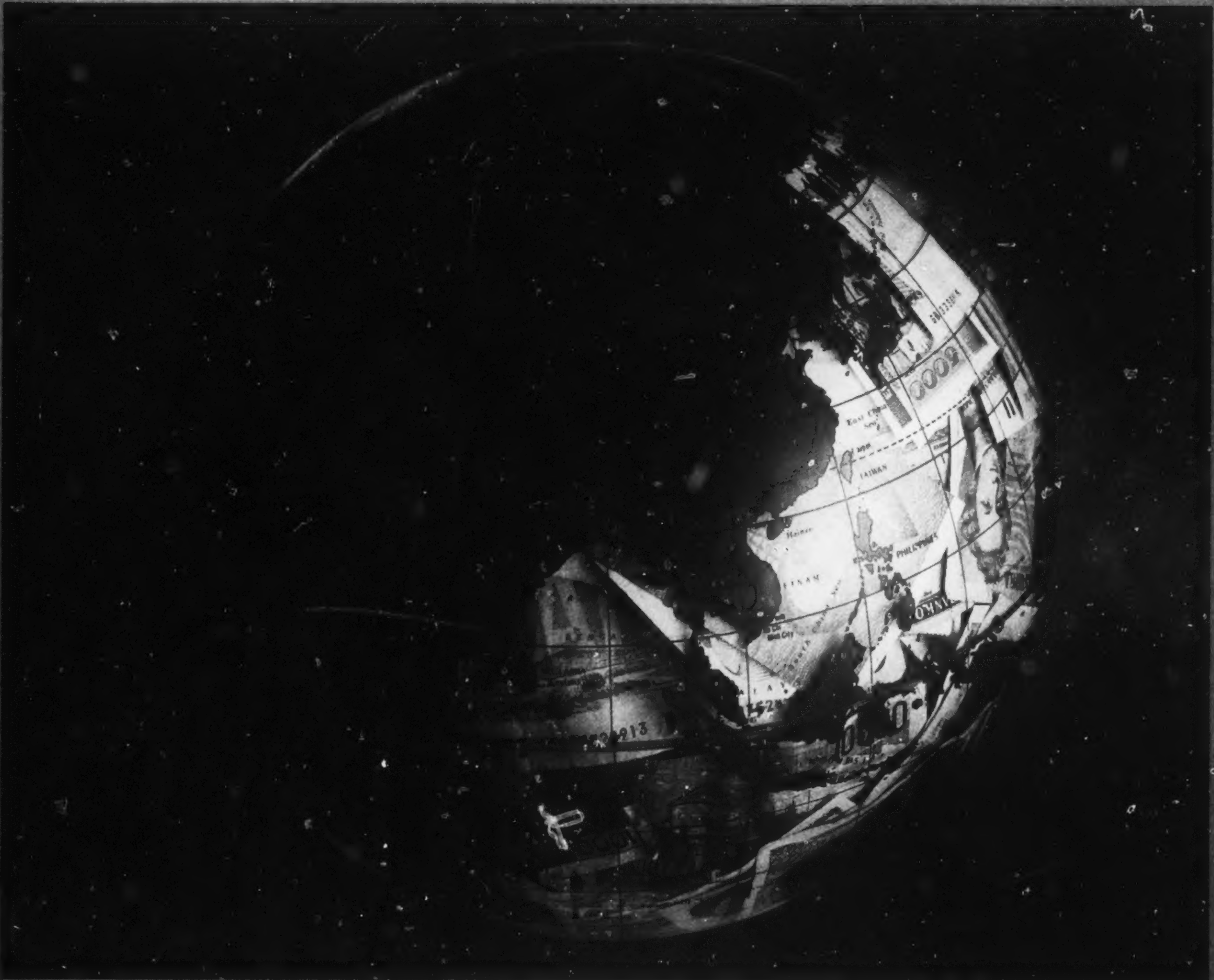


NEW GLOBAL MARKET DEVELOPMENTS

Political changes around the world mean new spending possibilities

SOFTWARE GLITCH CRIPPLES AT&T NETWORK

Millions of calls are blocked during nine-hour breakdown

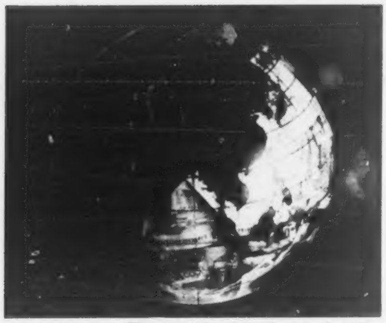
INDEPENDENTS DEMAND MFJ SAFEGUARDS

Small telcos refuse to back RHCs on easing MFJ restrictions

MONDAY, JANUARY 22, 1990 Volume 218, No. 4

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS



The world is full of opportunities for making money, even though growth in traditional telecom strongholds is minimal. Developing nations especially are beginning to burgeon with possibilities. Cover photo by Kenji Kerins, set design by Laura Doyle

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PTT leaders throughout the world face a new decade with an eye toward the next century

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In My Opinion

High-tech Achilles' heel

A remarkable thing happened last week: AT&T's long-distance network crashed. As AT&T Chairman Robert Allen observed, a network glitch of that magnitude is unprecedented. Yet it is a sign of how far we have come in telecommunications.

AT&T attributed the foul-up to its new switching software, which, ironically, is designed to speed recovery in the event of a network failure. Ultimately, the long-distance company had to shut down its backup system to allow the network to resume normal operation.

AT&T's sportsmanship is commendable. It's tough to wipe the egg off your public face and admit you screwed up somewhere along the line. Yet, if I were MCI or US Sprint, I don't think I'd jump at the opportunity to point out that AT&T's service is not as perfect as its clever advertising campaign suggests. Although that prospect is certainly tempting, a failure of that nature could happen at any time, to any carrier.

The intricacies of the intelligent network can be a blessing or a curse. If a true network failure were to occur, as happened in 1988 at Illinois Bell's Hinsdale CO, software such as what AT&T recently installed would abate the effects of the outage. That's what it's supposed to do and what it's expected to do. But when that safeguard fails or is the cause of the problem, it can knock out the network like a string of dominoes.

With the amount of intelligence being built into the network these days, it seems that software snags could become the Achilles' heel of the industry. Certainly, it is a tribute to the equipment and software manufacturers that something like this hasn't happened before. It's also noteworthy that the carriers have such high standards of equipment serviceability and that their networks are so reliable.

But what the AT&T malady should have shown everyone is that it doesn't take a fire or a flood to knock out service. Sometimes, all it takes is a confused software program.

Susan Ubis

Telephony

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INTERTEC

While Europe, North America and the Far East remain the three largest buyers of telecommunications equipment by far, the only significant growth in spending within the next year is likely to occur outside this realm.

Developing nations will see much faster growth in their network spending, as they seek to modernize and expand communications networks, according to the 1990 International Review and Forecast conducted by *Telephony's* Market Research Department. Growth of spending in the Middle East, Southeast Asia, Africa, South America and Central America will average 15%.

By contrast, growth of telecom spending in North America will remain virtually flat. In Europe and the Far East, it will average 6% and 5%, respectively. Although changes in exchange rates affect some of the totals reported, there are indications that the European market in particular did not live up to expectations last year.

While 8% growth was predicted, fueled by increased network modernization in preparation for the single market of 1992, the European market was actually off 7% from the previous year (see chart on page 42).

Yet uncertain is whether there will be any significant growth of telecommunications equipment sales this year in what is potentially the largest untapped market today: Eastern Europe and the Soviet Union. Although restrictions remain on the sale of much sophisticated telecom equipment to the Warsaw Pact nations, the rapidly changing political scene could send those restrictions the way of the Berlin Wall.

Italy Ignites

The sole bright spot in the otherwise

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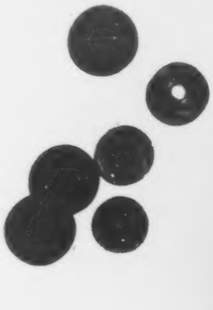

New Markets *continued*

slowing European market is Italy, which vaulted into second place, behind West Germany, in European telecom spending, passing France and the United Kingdom. Italy is expected to spend $6.7 billion this year as part of its ambitious plan to upgrade its public network. That's a 15% increase over 1989 spending.

The increase is part of a four-year plan launched last year by SIP, Italy's public network provider, aimed at bringing its network up to standards set by other industrialized European countries, says Paolo Benzoni, vice president-director for SIP. Italy plans to reach a 44% penetration rate for telephone service by the end of 1993, Benzoni says, and to reduce waiting time for service requests to two weeks.

The modernization effort includes deployment of fiber optics and transmission technologies, along with 55% digitization of switching facilities by 1993. To help accomplish those goals, Italtel, one of the primary switch providers in Italy, has created a joint venture with AT&T Network Systems International to bring new technology to that market.

Spending in France and the U.K. was off from previous years, while the increase in West German spending was marginal.

In the U.K., British Telecom spent about £3 billion ($4.8 billion) upgrading both its central office exchanges and its transmission gear, according to Graeme Odgers, group managing director. The company also turned its focus overseas as part of its strategy to become the leading worldwide telecommunications service provider. In the United States, for example, BT acquired 20% of McCaw Cellular

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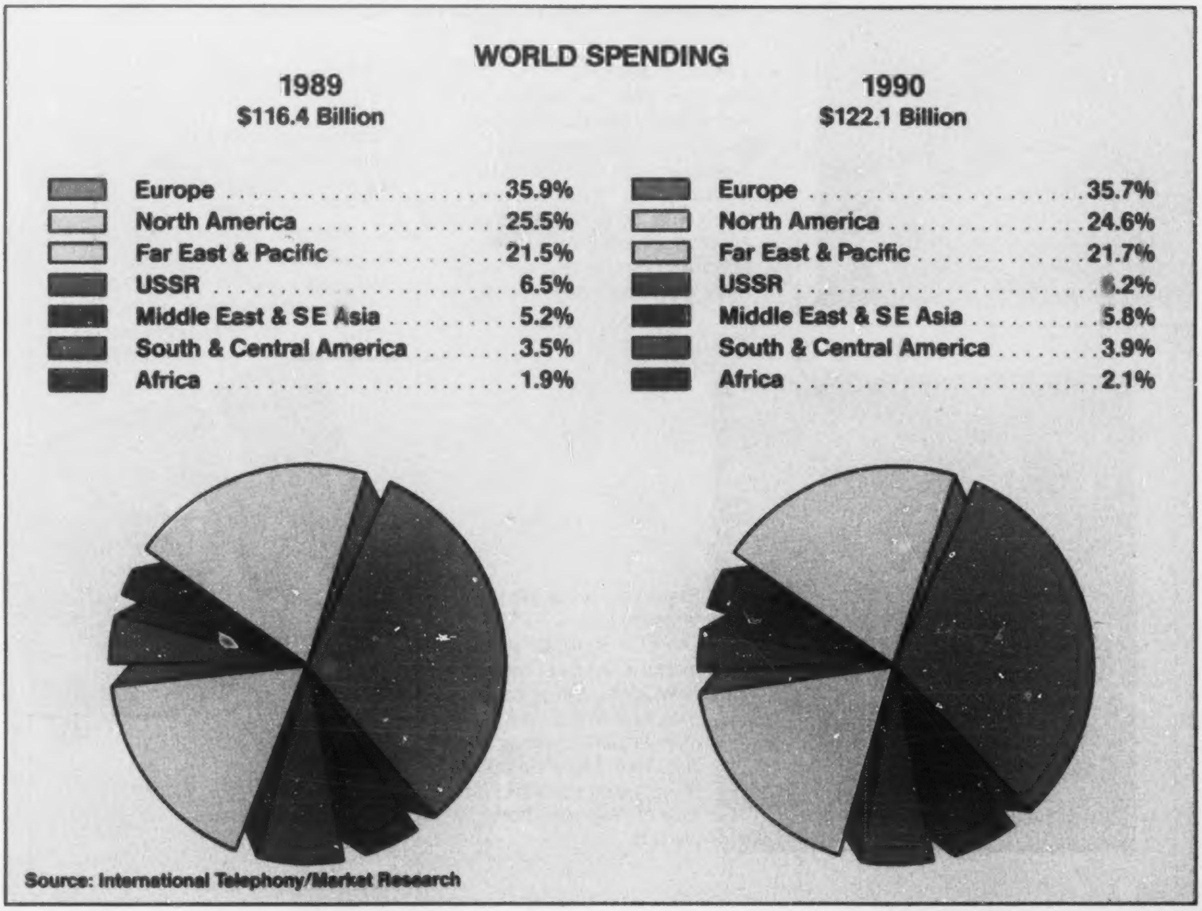
Methodology

The information in this report is based on exclusive primary research conducted by *Telephony's* Market Research Department from November 1989 through January 1990.

Each of the national telecommunications administrations was queried on its network expansion budgets for 1988-1991 and the anticipated distribution of the 1990 budget over 14 major plant and facilities areas.



Source: International Telephony/Market Research

New Markets *continued*

Communications, the largest cellular operator, and Tymnet, a large public and private data network provider.

Elsewhere in Europe, integrated services digital network deployment drove further digitization. West Germany's Deutsche Bundespost Telekom inaugurated its ISDN service in March 1989 and continued to digitize its network to facilitate further ISDN penetration. "Practical promotion of [ISDN] applications, which is seen as a partnership between users, manufacturers and Deutsche Bundespost Telekom, meets with lively response," says Dr. Christian Schwarz-Schilling, Telekom minister. "All told, more than 40 projects have so far been analyzed and their marketing opportunities examined."

The Swiss Telecom Department implemented the first stage of its ISDN plans, dubbed Swissnet 1, which made 64-kb/s digital service available. Full ISDN service is planned within three years. Increased demand for packet switching services also is driving the Swiss to upgrade their network, says Karl E. Wuhrmann, deputy general director of the Swiss Telecom Department.

The Austrian PTT also is gearing up for ISDN in the near future through accelerated digital switch conversion, according to Dr. Josef Sindelka, director general. The Austrian PTT is working with

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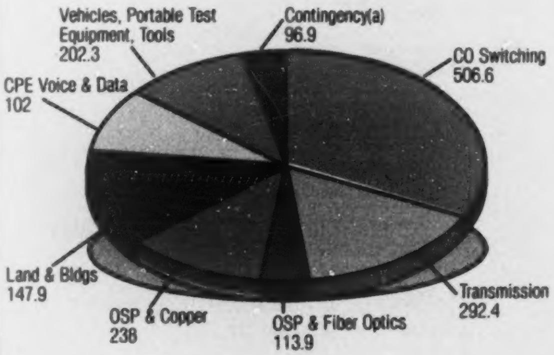
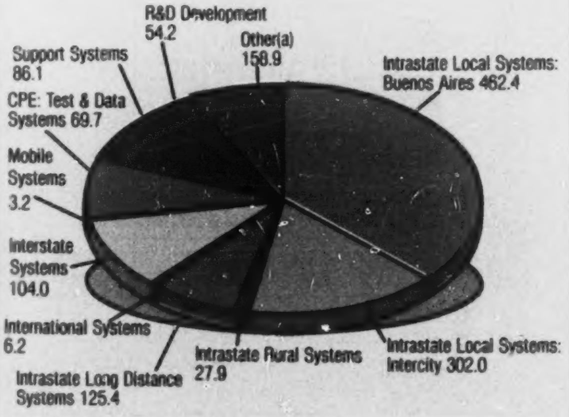
THE AMERICAS' NEWLY DEVELOPED COUNTRIES
1990 NETWORK EXPANSION
$ in millions

MEXICO: $1.7 BILLION



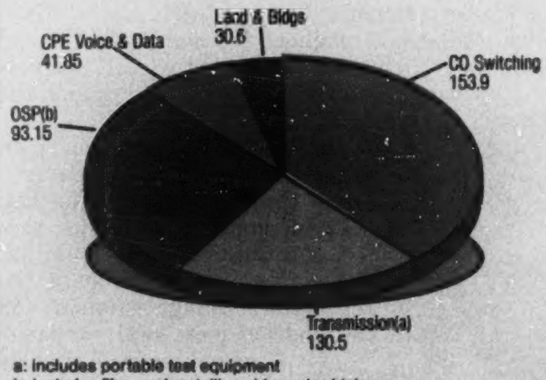
a: includes possible future acquisitions

BRAZIL: $1.4 BILLION

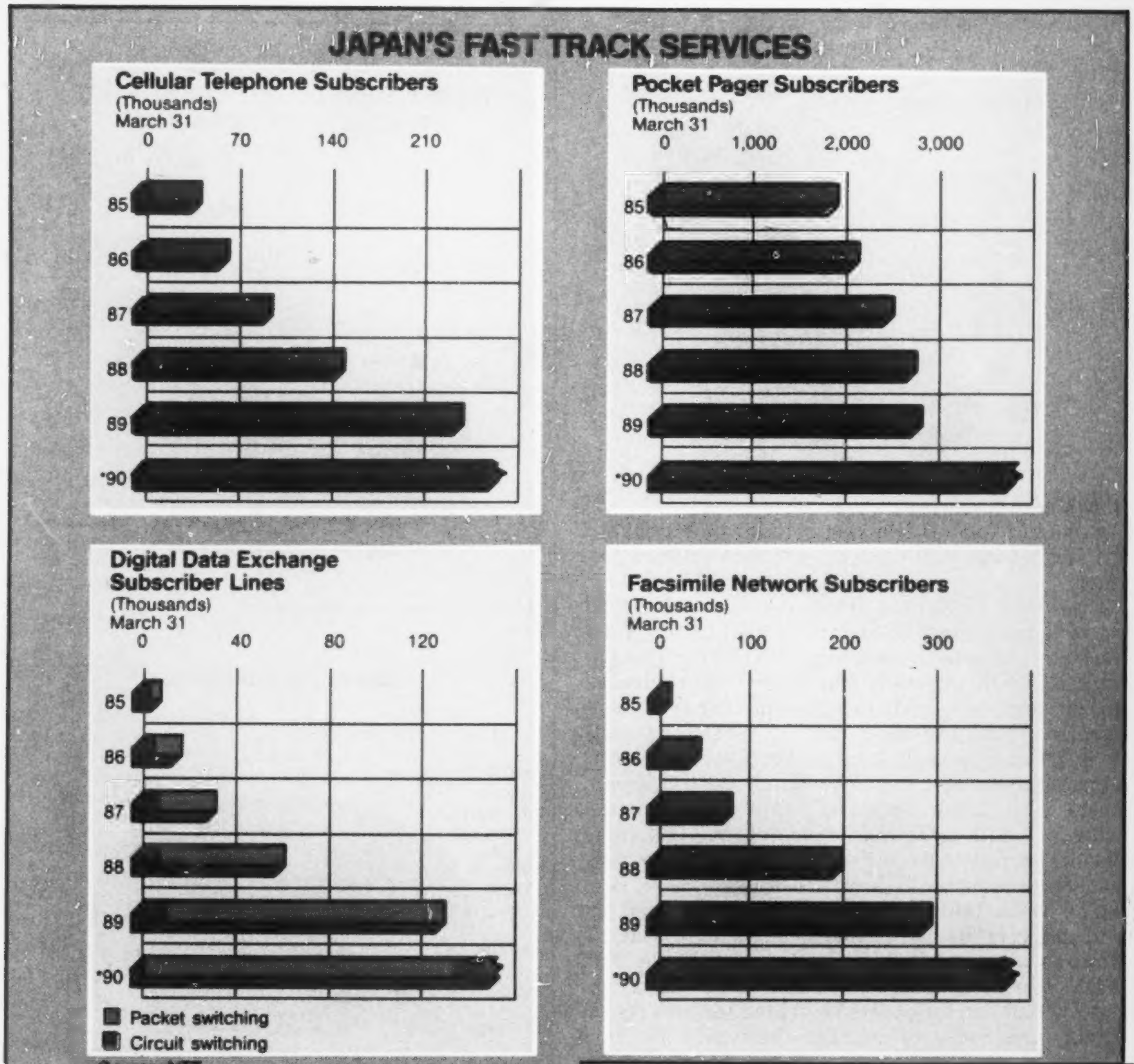


a: includes operations and technical investments

ARGENTINA: $450 MILLION



a: includes portable test equipment
b: includes fiber and metallic cable and vehicles



JAPAN'S FAST TRACK SERVICES

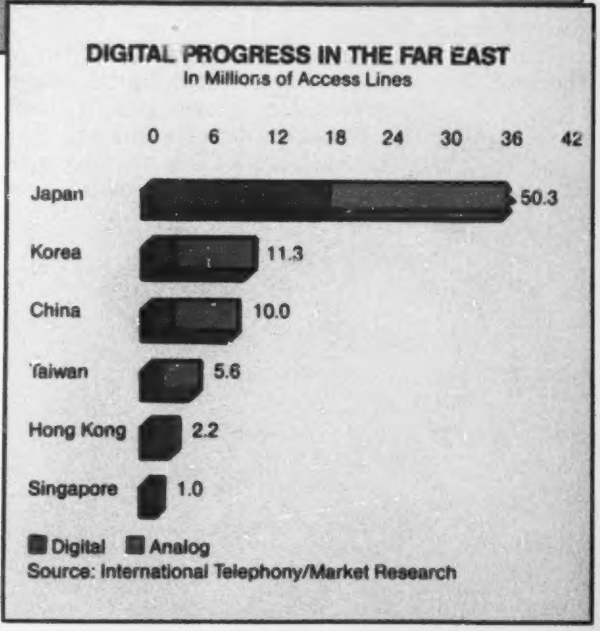
Cellular Telephone Subscribers

Pocket Pager Subscribers

Digital Data Exchange Subscriber Lines

Facsimile Network Subscribers

Source: NTT
*1990 estimated by Telephony



DIGITAL PROGRESS IN THE FAR EAST

In Millions of Access Lines

Source: International Telephony/Market Research

New Markets *continued*

the West Germans and Italians to interconnect digital networks.

In France, arguably Europe's ISDN leader, ISDN will be available throughout the country by the end of 1990 and will be interconnected with ISDN networks in Germany, the U.S., Finland, the U.K. and Japan.

Of the major North American market segments, only Canada projects growth, at about 5%. The Bell regional holding companies project spending at a level only 2% above this year's, and both the U.S. interexchange carriers and the Independent local exchange carriers project slightly less spending. (For details

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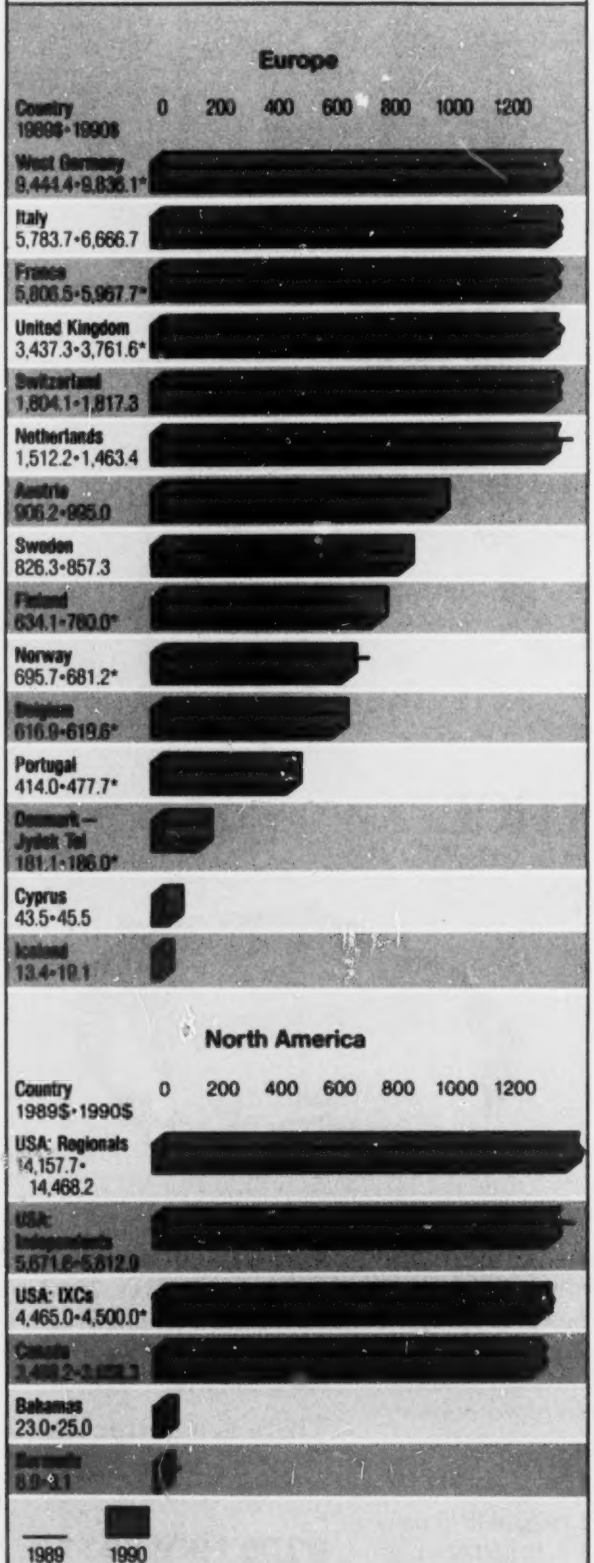
1989-90 WORLD SPENDING
$ IN MILLIONS



* estimated by International Telephony/Market Research

New Markets *continued*

on the North American market. see *Telephony, Dec. 18, 1989, page 30.)*

Telecom Canada is launching two major initiatives this year: the first is the completion of a 6333-kilometer fiber optic network linking Nova Scotia in the East with Vancouver, British Columbia, in the West and providing 565-Mb/s transmission speed. The second is network digitization which, combined with signaling system 7 deployment, will make ISDN service possible across Canada. Bell Canada, New Brunswick Telephone Co. and Alberta Government Telephones have already launched ISDN trials. An ISDN trial between the three companies began in November.

The most widespread use of ISDN to date, however, has been within the Japanese market. Nippon Telegraph and Telephone Corp. continues to introduce new services on its INS-Net 64, the wide-area ISDN launched in 1988, and to expand service availability. In June 1989, the company introduced INS-Net 1500, expanding its ISDN capabilities, according to Harvo Yamaguchi, NTT president.

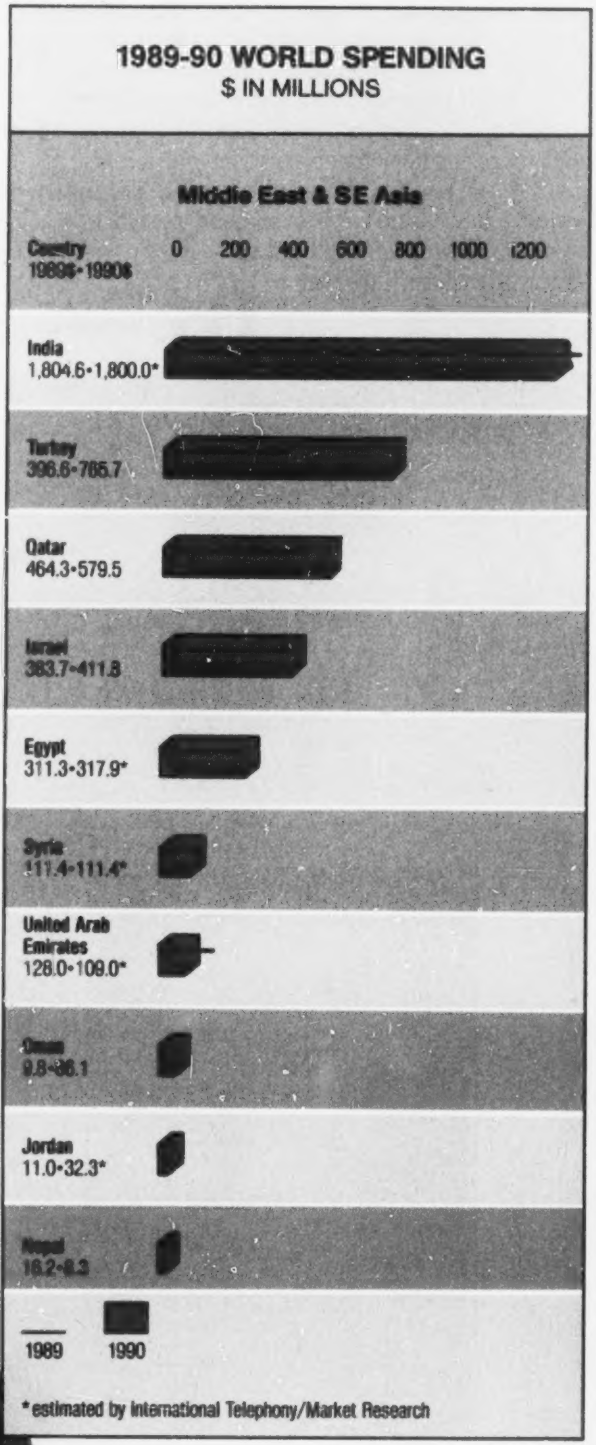
Mobile communications, facsimile networks and

continued on page 46

THE TOP 25 WORLD SPENDERS: 1990
$ IN MILLIONS

Country	
USA	24,081.1
Japan	12,142.9
W. Germany	9,836.1
Italy	6,666.7
France	5,967.7
United Kingdom	3,761.6
Canada	3,658.3
Australia	2,346.2
South Korea	2,236.8
Switzerland	1,817.3
Mexico	1,695.0
Netherlands	1,463.4
Brazil	1,411.9
Taiwan	1,334.3
South Africa	1,032.6
Austria	995.0
Sweden	857.3
Turkey	765.7
Finland	760.0
Norway	681.2
Belgium	619.6
Qatar	579.5
New Zealand	522.2
China	500.0
Portugal	477.7

Source: International Telephony/Market Research



New Markets *continued*

digital data exchange lines also represent booming markets for NTT (see chart on page 40).

Political winds blew upon the burgeoning Chinese market. But the turmoil of last summer has not significantly affected the country's massive network modernization plans. China is expected to increase its spending by two-thirds to $500 million this year.

By 1990, China expects to have a total of 17.5 million local access lines in service, a 75% increase over what was available in 1985, reaching a density of one telephone per 100 people. "The new communications services, such as mobile communications, toll direct dialing, radiopaging, data retrieval, Telefax and electronic mail, will be further expanded in 1990," says Minister Tai Fang Yang of

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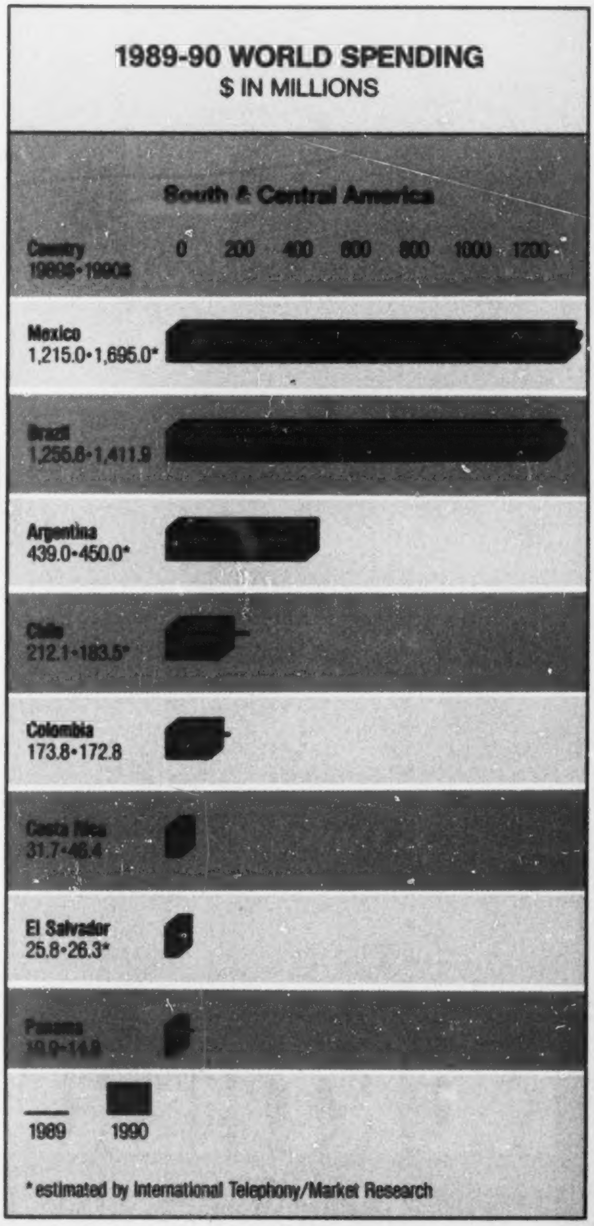
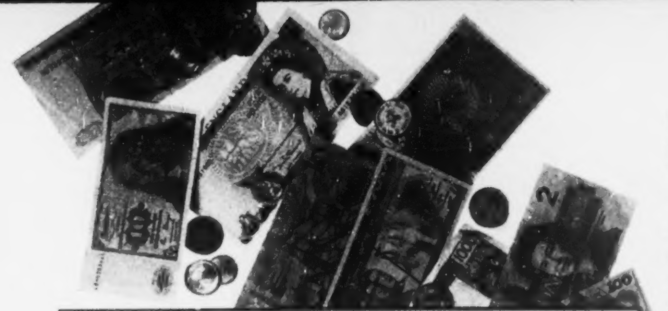


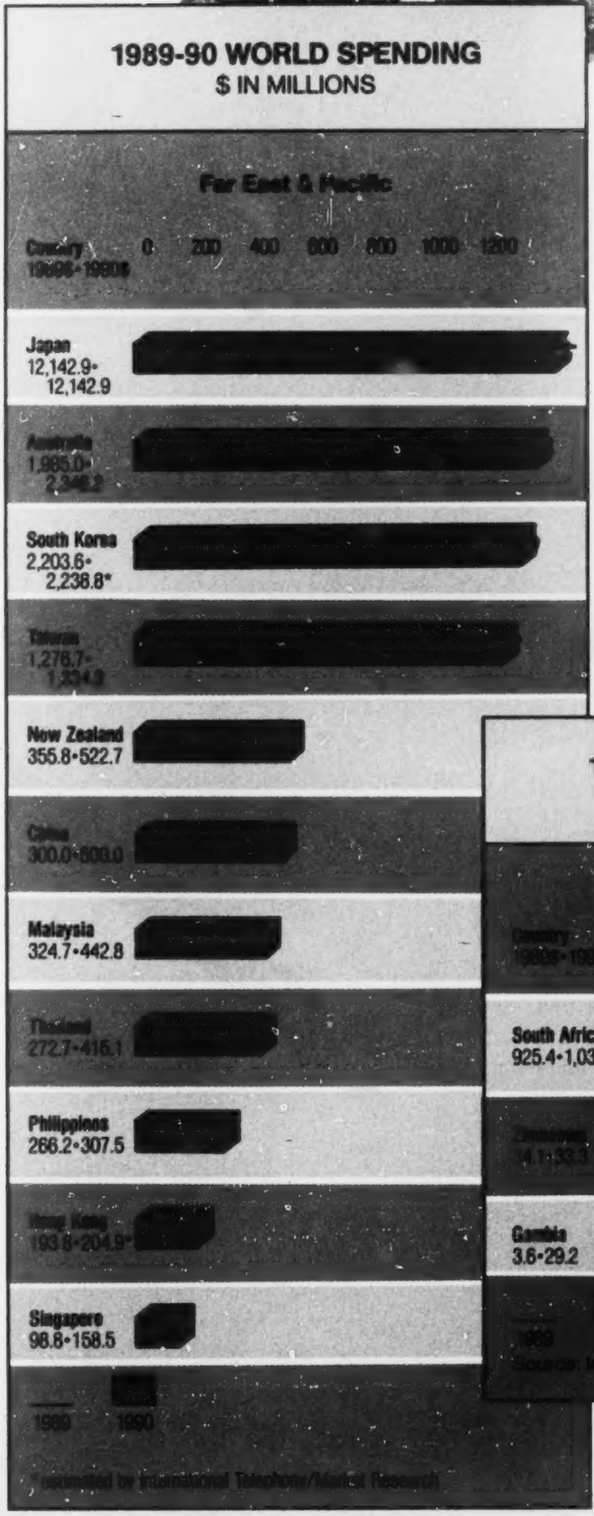
New Markets *continued*
the Chinese Ministry of Posts and Telecommunications.

Elsewhere in the Far East, the Korean Telecommunication Authority faces privatization in 1990 and, to prepare for competition, plans $2.2 billion in network improvements, including testing of electronic telephone directory database systems, construction of a cable television network for trial use and installation of 2.8 million new switching lines.

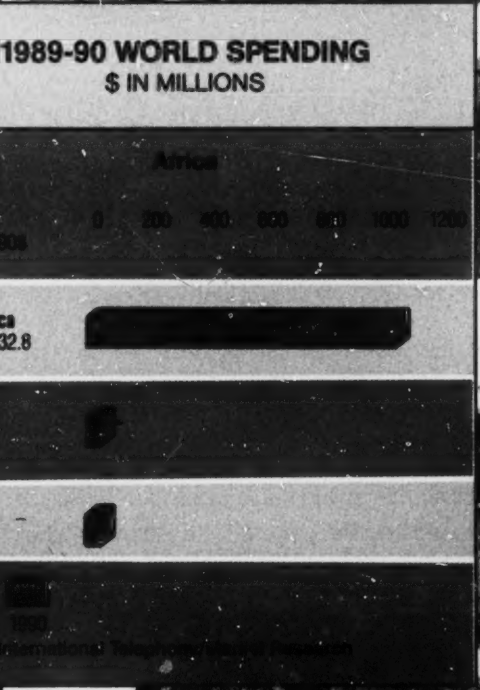
Developing Networks
Some of the most intriguing developments are in developing nations, where investment in telecommunications network enhancements are viewed as keys to economic development and growth (see chart on page 39). Mexico, which ranks 11th in worldwide telecom spending at $1.7 billion, will invest the majority of that in improved central office switches ($507 million) and transmission gear ($292 million).

As other nations in Central and South America, Africa and the Middle East also invest more heavily in both land-based and cellular networks, that market segment is certain to draw more attention. ■





*Estimated by International Telephony/Market Research



Source: International Telephony/Market Research

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Telephony

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FINDING A KEY TO THE MARKET

New features are just not enough to stay alive in a flat market

U.S. CHANGES POSITION ON HIGH-TECH EXPORTS

Administration wants to relax rules on sales to Eastern Europe

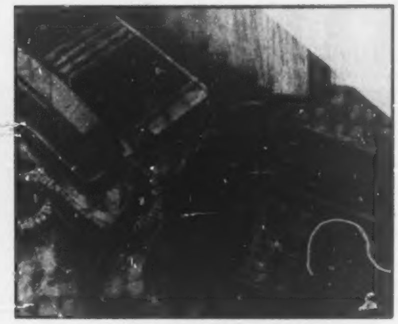
TTSI UNVEILS INTELLIGENT NETWORK PRODUCTS

Tandem offers multifunction SCP, service management system

MONDAY, JANUARY 29, 1990 Volume 218, No. 5

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS



The key system market is flat—even Columbus would admit it. But there's still money to be made and plenty of opportunity. Cover art by Laura Doyle

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By Deborah Pfeiffer. How do you stay alive in a market that everyone calls flat? Some key system manufacturers have distinguished themselves by offering something other than new features

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Finding a key to the market

Even Columbus would admit it—
the key system market is flat, flat, flat.
But there's still money to be had and
plenty of opportunities just around the corner

DEBORAH PFEIFFER, Associate Editor

The key system market is flat, and that's a fact. Anyone in the industry—manufacturer, distributor, analyst—will tell you the same story.

But despite having a flat growth rate, the industry isn't disappearing. In 1989, it boasted $4.3 million in shipped stations and was valued at $990 million, according to the North American Telecommunications Association's 1990 *Telecommunications Market Review and Forecast.* The market also is competitive—the top 10 players in terms of market share have shifted quite a bit in the last couple of years (Tables 1 and 2). This could translate into future opportunities for manufacturers if they take advantage of current trends.

The key system market is flat because it's a com-

continued on page 24

TABLE 1
1989 KEY SYSTEM MARKET SHARES
(BASED ON STATIONS SHIPPED)

AT&T	21.7%
TIE	19.0
Executone	9.7
Toshiba	7.6
Northern Telecom	4.8
Inter-Tel	4.5
Iwatsu	3.7
Panasonic	3.7
NEC	3.5
Fujitsu	3.2

Source: Northern Business Information/Datapro

TABLE 2
1988 KEY SYSTEM MARKET SHARES
(BASED ON STATIONS SHIPPED)

AT&T	20.8%
TIE	17.2
Executone	15.0
Toshiba	8.3
NEC	4.7
Iwatsu	3.5
Inter-Tel	3.5
Fujitsu	3.0
Mitel	2.5
Comdial	2.3

Source: Northern Business Information/Datapro

Finding a Key *continued*

modity market. Although there are several industry players, most companies' systems share similar features and are differentiated primarily by price. Many industry participants had counted on a demand for digital and integrated services digital network key systems to refuel the market. Although digital and ISDN systems still may fuel growth, replacement cycles or change-outs haven't happened as fast as some manufacturers had counted on. In many cases, the customer prefers to maintain its installed base and enhance it with adjuncts such as voice mail and auto-attendant, which have become increasingly available and are less expensive than buying brand new systems.

Since features are fairly common among all systems and price margins are being squeezed, many companies are struggling to find other methods to differentiate their products.

Since features are fairly common among all systems and price margins are being squeezed, many companies are struggling to find other methods to differentiate their products.

Service with a Smile

"Service and distribution are big things in a mature market, because everyone's selling the same boxes. And some are just selling each other boxes," says Richard Klugman, research analyst for Northern Business Information/Datapro. Besides service and distribution, companies also have targeted specific sections of the market such as marketing products with lower line sizes to small businesses.

For example, AT&T manufactures two lines—Spirit and Merlin—with the Spirit line geared toward companies that do not want all the features that Merlin offers, says Peter Bernstein, senior analyst for Probe Research. Many companies are stressing ease of system use, the ability to integrate and update systems, voice-data capabilities and special vertical market applications.

"This is a competitive market, and it is forcing margins down at the manufacturing level and at the dealer level. In this market, you've got to bring something else to the table other than technology and price," says Peter J. Harrow, vice president of national sales for WIN Communications Corp. "We've focused on the service issue. After all, how many features can you put on a telephone system that users could regularly use?" His company announced its 96-port Marathon 100D digital key system with a built-in 2B+D protocol at NATA's Unicom '89 show in Dallas last December. WIN's new service plan, based in part on an extensive survey of customers about its potential marketing ideas, was one of many announced at the show.

AT&T offers a shining example of how companies can make money by targeting certain areas of the market. The company has been the market leader for several years now. It is unique due to its dedicated sales and service support for small businesses, says Miles Penland, manager-strategic analysis for AT&T General Business Systems Division. "This puts us in a position to get feedback from the customers," he says. The company is able to develop new products and services based on the suggestions brought back through the direct sales channel.

AT&T's new Merlin cordless business phone, which works with the company's existing Merlin line, exemplifies the use of innovation to fulfill the needs of small business customers, according to Penland.

Probe Research's Bernstein agrees. "The Merlin cordless phone brings wireless into the office. It's a new product idea that vendors can sell—it's new and exciting. The cordless phone will save people money and give them mobility in the office."

For example, the system is attractive to wholesale distributors with large warehouses and auto dealerships, notes Penland.

But the cordless phone will be an interim product only, Bernstein predicts, leading to a digital wireless key system similar to those being introduced in Europe early next year.

Changing Channels

Key system manufacturers also have experimented with changes in distribution to cut costs and thereby distinguish their products in the market.

"Distribution is always critical in a commodity market. You want to get the best level of representation," says Ken Landoline, associate director, telecommunications industry service for Dataquest. Several manufacturers have switched to direct distribution in the past few years in an attempt to copy AT&T's success.

Most have been unsuccessful, says Klugman. "There's a problem with gobbling up interconnects—it doesn't help if the customers aren't familiar with the product."

Northern Telecom, however, has used distribution to spur sales of its Meridian Norstar line of digital key telephone systems. In 1989, the company went from being essentially a non-player in the market to landing in the top 5 list. Northern has expanded its market share predominantly by enlisting all seven Bell regional holding companies' operating companies to distribute Norstar, as well as the major national Independents and some regional distributors, says John Losier, general manager of Meridian Key Division. "We are supporting distribution in every area of cost associated with the business," he notes. For example, through its Norstar Express 24-hour delivery service, Northern essentially manages all the inventory, providing a shield for distributors and cutting their carrying costs, he says. The company also has concentrated on making the product simple to install.

But despite these successes due to innovative service and distribution methods, most key systems still are sold solely on price.

AT&T Merlin cordless telephone

Northern Telecom's Meridian Norstar M7324 digital key telephone

> *'Service and distribution are big things in a mature market, because everyone's selling the same boxes.'*

"The players in the market have tried almost everything to differentiate—modularity, size, features, maintenance contracts, delivery times, give-away programs. There is little that hasn't been tried in the sales approach. But price still seems to be the differentiating factor," Losier says.

The drive to lower prices to remain competitive has brought on several industry changes. While some companies have tried different distribution methods to gain cost efficiencies, others have turned to manufacturing outside of the United States to cut prices. This price-cutting solution has caused quite a tremor in the business.

Don't Dump on Me

In December 1988, AT&T and Comdial filed an anti-dumping petition with the U.S. International Trade Commission and the U.S. Department of Commerce against small telephone system manufacturers importing systems (mainly key systems) produced in Japan, South Korea and Taiwan and selling them in the U.S. for less than fair value. The Commerce Department later assessed most of the companies cited, with the exception of Sun Moon Star, with dumping margins. Those companies now are required to post cash, bonds or securities in the amount of the dumping rate on all subsequent shipments. Among the specific companies named were Toshiba and Matsushita of Japan, Nitsuko of Taiwan, and

continued on page 26

Finding a Key *continued*

Samsung Group and Lucky Gold Star Group of Korea.

There is some debate on how this anti-dumping decision will affect the industry. Iwatsu America, one of the companies potentially affected by the decision, actually started planning to manufacture in the U.S. more than two years ago because of trade issues and is currently doing so out of its Carlstadt, N.J., headquarters. The company thinks this will make it more attractive to customers, says Nobuo Sato, vice president of marketing for Iwatsu. Toshiba has announced plans to expand its manufacturing outside of its facility in Irvine, Calif. Several interconnects have scrambled to align themselves with other, or more, companies, anticipating that affected manufacturers will be forced to raise their prices.

"The whole dumping question has had a big effect on the industry. We can assume that in 1990 the margin pressures will not be as great. But prices won't drop. The market still will be incredibly competitive because there are a lot of players," notes Bernstein. "You're probably going to see off-shore vendors starting to manufacture in the U.S. It will be an interesting shift, seeing how that works with distribution."

AT&T, an initiator of the petition, sees the decision by the Commerce Department and ITC as setting up a level playing field within the industry, says spokeswoman Simone Acque. She foresees some companies moving their manufacturing operations to this country.

"For all companies in business it's very risky to raise prices, so they're trying to move on-shore. I think it will be good for AT&T; it will buy them market share. It will also cause some people to drop out. Otherwise the anti-dumping decision will have a negligible effect on companies, other than the cost of moving product facilities," says Landoline.

Prices probably won't go up in the long term despite the anti-dumping decision, agrees Klugman. "Some foreign companies can only sell in this country. It's the biggest key system market in the world, and companies can't afford to be shut out of it." He notes, though, that many companies already have relocated or will relocate their assembling operations to Malaysia or Thailand because of the cheap labor there, since these countries weren't cited in the decision. "So they're clear for now. I don't know what will happen in the future. But I doubt we'll see increased manufacturing in the U.S. because of this," he adds.

Northern Telecom, which manufactures in North America, also was not directly hit by the anti-dumping ruling, but industry prices "will reflect the true cost of building a product, so any effect would have to be good for us," says Losier.

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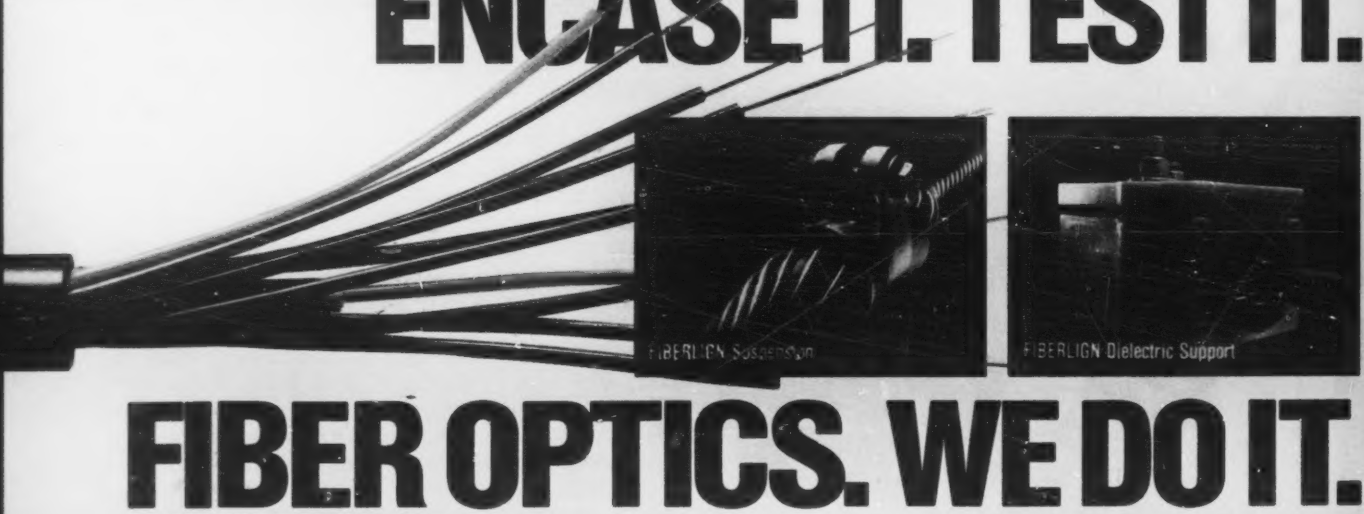

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Change-outs in digital and ISDN have yet to occur. Analysts agree that digital hasn't yet had the impact on the market that was hoped for. Increasingly, companies are introducing digital systems, including recent introductions such as Telrad Telecommunications Inc.'s Symphony II and Sun Moon Star's DKTS-Mini. The timing for ISDN also is not right. Several companies have built-in voice-data capabilities comparable to ISDN services. But many companies, especially smaller ones, are waiting until 2B+D standards are set and for ISDN services to be offered over the public network.

"Norstar offers ISDN in the way it handles messaging and simultaneous voice and data, and its internal signaling is based on basic rate. When ISDN is offered on the public network, Norstar's design will allow easy migration," says Losier. Northern will implement ISDN on Norstar depending on how ISDN is deployed in the public network, he says.

It will be about five years before a major surge in ISDN key systems occurs, says Klugman.

ISDN behind Centrex will be a major opportunity for key system makers, according to Bernstein. Since the nature of Centrex has been changing, making it more popular with small businesses, systems with basic rate for small businesses will give the market a good boost, he says.

Other market trends to watch for are the proliferation of voice mail and automatic call distribution capabilities, notes Bernstein. The increasing number of hybrids, switches that can be configured as key systems, PBXs or something in between, also has had its effect on the market. Products such as Panasonic's 192-port DBS, Fujitsu Business Communication Systems' Starlog II and Northwestern Bell Phones' Integra hybrid systems are examples of this effort to carve a niche in the market. And there is some debate as to whether the lower costs for PBXs are taking business from the high end of the key system market. It's difficult to determine how key systems are competing with PBXs because of the proliferation of hybrid systems, notes Bernstein. "It's hard to say what the animal is in the first place. [The terms key system and PBX] are really artificial classifications—it becomes a semantic argument."

But Dataquest predicts a clear trend. The company estimates that the compound average growth rate for the number of U.S. phone lines shipped from 1989 to 1993 in the one- to eight-line market will be 4.7%. The same figure for the 48+ line market, however, will be −6.1%. Dataquest attributes this negative figure to lower PBX prices.

Key system manufacturers do have choices. Figuring out what new feature to add to a new product isn't one of them. But acting on the strengths of the company and the market is. ■

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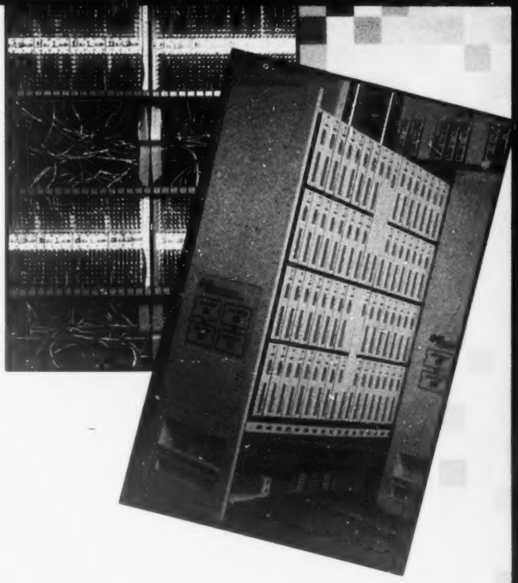

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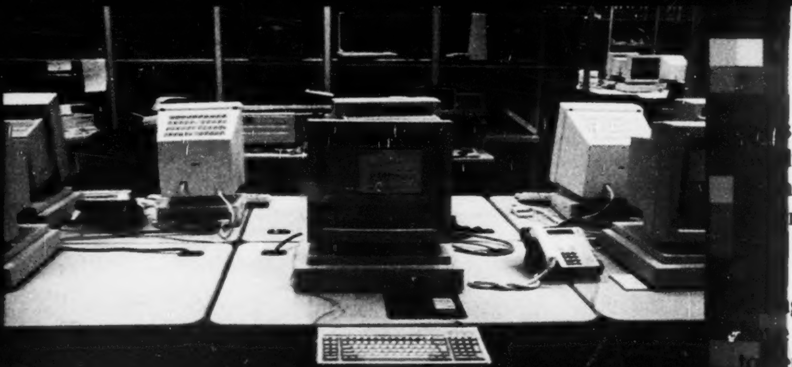

Use[illegible] pays [illegible]

DAWN BUSHAU[illegible]
Assistant Editor

PAUL TRAVIS
Executive News Editor

For years, the critics said "ISDN" stood for "innovations subscribers don't need" or "it still does nothing." That no longer is true, according to communications managers who are using ISDN today.

It still will take many years before ISDN fulfills the promise of providing a seamless, ubiquitous network with end-to-end integrated digital transmission of voice, data and video signals. But dozens of communications managers said in recent interviews that they are enjoying some of the benefits of ISDN now—and they expect to enjoy many more in the future.

The benefits available today include reduced communications costs, greater flexibility in allocating bandwidth, cleaner transmission lines, faster data transmission speeds, easier wiring schemes, improved employee productivity, and several new features and applications.

There still are problems, ISDN users are quick to acknowledge. ISDN customer premises equipment is in short supply and usually very expensive. Development of innovative applications has been slow. Service is available only in limited areas. Tariffing and pricing ques[illegible] remain un[illegible]ved. Inter[illegible]ection be[illegible]n LATAs is [illegible] available, [illegible] local ex[illegible]ge carriers [illegible] been slow [illegible]ploy signal[illegible]ystem 7.

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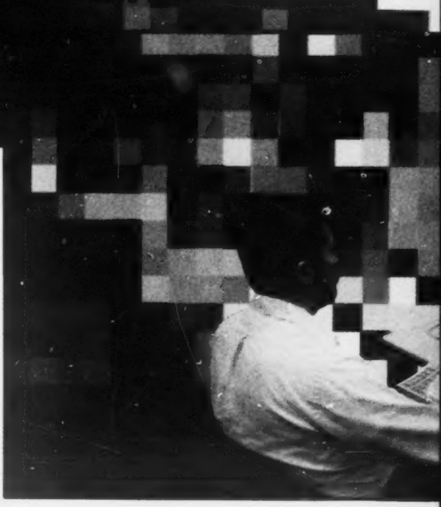
[illegible] Po[illegible] a T-1 [illegible] Nevada Be[illegible] ny locations in [illegible] date a host of W[illegible] kb/s data link. "In effect, we g[illegible] free channels because the 56 kb[illegible] costs about the same as the T-1," says Steve Backe, manager of computer operations and telecommunications. He reports that overall communications costs dropped from about $25,000 a month to $20,000 once ISDN was implemented

CSX Corp. replaced seven T-1 lines with five primary rate lines at its Jacksonville, Fla., office. The lines mostly carry voice traffic, but the company is making use of automatic number identification, according to Preston Lawson, senior director of telecommunications engineering. CSX expects to save about $30,000 annually.

Comdisco Disaster Recovery Services Inc. is saving about $2700 a month using an AT&T Definity PBX with a primary rate interface. The company has been using one primary rate line for a year and plans to add two more lines in the near future, according to John Sharkey, telecommunications product manager.

It is hard to generalize about savings because savings can differ between private and public network implementations. Costs can be greatly influenced by the types of equipment and applications used and by the prices charged by carriers. Pacific Bell, Illinois Bell and Southwestern Bell are the only Bell operating companies that have ISDN tariffs.

Many organizations that participated in early ISDN trials could not identify savings because they received service for free. The Travelers Companies got 20 basic rate lines from Southern New England Telephone at no charge. Wisconsin Bell provided 17 basic rate lines to Alverno College in Milwaukee. U S West supplied primary rate and basic rate lines to Arizona Public [illegible]o. "because we were a beta [illegible]ery pleased with [illegible] standard for the [illegible]



visor of telecommunications operations and services.

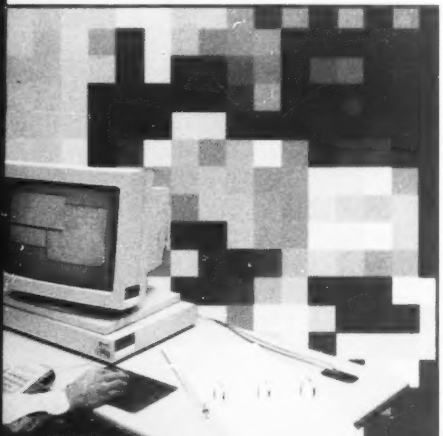
Much of the ISDN in use today is supplied under special contract arrangements. Hardee's Food Systems is using 32 ISDN Centrex lines from Carolina Telephone & Telegraph Co. in Rocky Mount, N.C. In a partnership arrangement with the telco, Hardee's paid part of Carolina Tel's costs of upgrading to ISDN. "We expect Carolina Tel to price it in the $25-per-line range for lines out of the same central office," says Lynn Smith, Hardee's telecommunications director.

Some users, however, are not happy with the price they are paying for ISDN. Virtually all who are not using a tariffed service agree that tariffs are badly needed. And many say pricing questions won't be resolved until ISDN is tariffed.

Teleos Communications Inc. pays New Jersey Bell about twice as much for 15 ISDN lines as it is pays for ordinary Centrex lines. "The savings for us right now is non-existent," says Tibor Szekeres, vice president of business development. "But once it's tariffed it should be about $20 a line for basic service and X.25 [packet-switched] service will be $10 extra.

"For $30 we'll be getting twice the capacity and four times the performance plus X.25 and much better voice quality," he says.

Microcom Inc., a West Roxbury, Mass., modem manufacturer, is paying 10 times as much for basic rate [illegible] it p[illegible]alog servic[illegible] N[illegible]ele-phone, ac[illegible]ang, senior produc[illegible].



"That's why we [illegible] 60 lines. We have to pay [illegible] ISDN costs. They're [illegible] pay for all of their risks[illegible]

One user, who declin[illegible] identified, says it cost [illegible] pany about three times [illegible] to switch from 24 DID trunks to [illegible] T-1 with ISDN. "It doesn't seem right. In effect, we returned 22 pairs to the telco to earn revenue from another customer. It seems to me they ought to be reducing our costs," he says.

For many, the savings and benefits come from areas other than the price of the service.

McDonald's Corp. pays about 1.25% more for its 2000 ISDN lines than it paid for regular analog Centrex services from Illinois Bell, but expects to save about 10% to 20% in total telecommunications costs, says Patrick Krause, director of communications.

"The savings in other areas more than offsets the increased line charge," Krause says. For example, uniform wiring is eliminating expensive rewiring costs incurred in department moves or employee changes, he says.

Several users cite that as a significant benefit.

Some of the biggest benefits come from ISDN features that allow networks and people to operate more efficiently. Many users praise the ability to dynamically allocate bandwidth.

"The biggest advantage of ISDN is its flexibility," says Robert Alasker, vice president-management information systems for American Creditors Bureau Inc., which consolidated about 70 dedicated trunks on two primary rate lines from U S West into its Phoenix headquarters.

"We can allocate channels according to our needs at any point. If we have a lot of inward 800 calls in the morning, we can allocate channels for that. We can then reconfigure those channels later in the day for outgoing calls," Alasker says.

Others cite ISDN's ability to deliver 64-kb/s channels. "T-1 was very costly and we were limited to about 19.2 kb/s to the desktop," says Hardee's Smith. Hardee's com[illegible] programmers are in a differ[illegible]n than its mainframe [illegible]

[illegible]ching to ISDN, it looks to [illegible]mmer like he is still at [illegible]adquarters. Without ISD[illegible] have to spend thousan[illegible] to deliver 144 kb/s to a u[illegible]

A numbe[illegible] say the ability to use auto[illegible] identification to retrieve customer records from a database has greatly improved the productivity of service agents. Several say that the speed with which ISDN sets up and tears down a call connection has significantly boosted the efficiency of their networks. Others say the network ringback feature is a favorite because it saves them from continually dialing and getting a busy signal.

Another key benefit is the quality of transmission on an ISDN line, according to users contacted by *Telephony*. "We're having to install music-on-hold because it is too quiet on the circuits. Our customers think we've hung up on them. The telephone company has jokingly offered to tariff a little noise for us," says William A. Hurd, senior telecommunications specialist for Arizona Public Service Co.

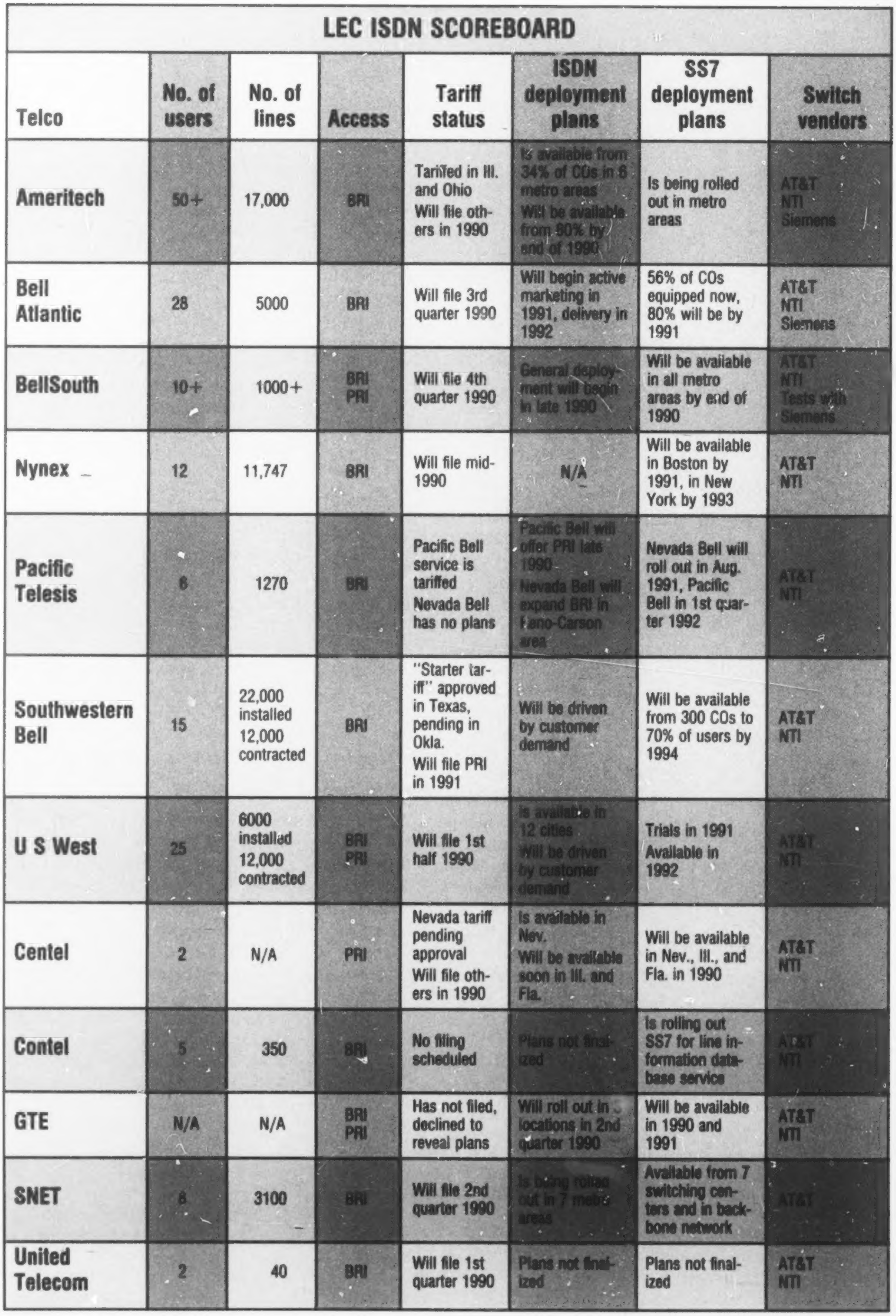
Early Headaches

Being an early implementer of ISDN isn't all benefits and savings, however. Software and hardware problems plagued many early ISDN users. Several communications managers say they were surprised at how much effort was required to make ISDN invisible to their users. But most say things have gotten better.

McDonald's suffered long delays in finding and resolving problems about a year ago because of a lack of network management tools. "But we've seen major improvement in that," Krause says. Vendors were quick to develop better tools, he adds. "The basic software has matured and the number of problems has been cut in half."

Several users are disappointed that they currently are unable to interconnect several company locations with ISDN. McDonald's is planning to set up ISDN networks in its Atlanta and Milwaukee offices in the near future, and the company also is exploring deploying ISDN in its individual stores. Krause says the company would eventually like to see signaling system 7 connect offices. But until it is available ubiquitously switched 56 or packet-

continued on page 15



LEC ISDN SCOREBOARD

Telco	No. of users	No. of lines	Access	Tariff status	ISDN deployment plans	SS7 deployment plans	Switch vendors
Ameritech	50+	17,000	BRI	Tariffed in Ill. and Ohio Will file others in 1990	Is available from 34% of COs in 6 metro areas Will be available from 80% by end of 1990	Is being rolled out in metro areas	AT&T NTI Siemens
Bell Atlantic	28	5000	BRI	Will file 3rd quarter 1990	Will begin active marketing in 1991, delivery in 1992	56% of COs equipped now, 80% will be by 1991	AT&T NTI Siemens
BellSouth	10+	1000+	BRI PRI	Will file 4th quarter 1990	General deployment will begin in late 1990	Will be available in all metro areas by end of 1990	AT&T NTI Tests with Siemens
Nynex	12	11,747	BRI	Will file mid-1990	N/A	Will be available in Boston by 1991, in New York by 1993	AT&T NTI
Pacific Telesis	6	1270	BRI	Pacific Bell service is tariffed Nevada Bell has no plans	Pacific Bell will offer PRI late 1990 Nevada Bell will expand BRI in Reno-Carson area	Nevada Bell will roll out in Aug. 1991, Pacific Bell in 1st quarter 1992	AT&T NTI
Southwestern Bell	15	22,000 installed 12,000 contracted	BRI	"Starter tariff" approved in Texas, pending in Okla. Will file PRI in 1991	Will be driven by customer demand	Will be available from 300 COs to 70% of users by 1994	AT&T NTI
U S West	25	6000 installed 12,000 contracted	BRI PRI	Will file 1st half 1990	Is available in 12 cities Will be driven by customer demand	Trials in 1991 Available in 1992	AT&T NTI
Centel	2	N/A	PRI	Nevada tariff pending approval Will file others in 1990	Is available in Nev. Will be available soon in Ill. and Fla.	Will be available in Nev., Ill., and Fla. in 1990	AT&T NTI
Contel	5	350	BRI	No filing scheduled	Plans not finalized	Is rolling out SS7 for line information database service	AT&T NTI
GTE	N/A	N/A	BRI PRI	Has not filed, declined to reveal plans	Will roll out in 5 locations in 2nd quarter 1990	Will be available in 1990 and 1991	AT&T NTI
SNET	8	3100	BRI	Will file 2nd quarter 1990	Is being rolled out in 7 metro areas	Available from 7 switching centers and in backbone network	AT&T
United Telecom	2	40	BRI	Will file 1st quarter 1990	Plans not finalized	Plans not finalized	AT&T NTI

Payoff *continued*

switched service will be used.

3M Corp. wants to link its St. Paul, Minn., office with the 3M Austin Center in Texas via SS7, possibly as early as March, says Lou French, manager of 3M's ISDN project in Austin. But that plan depends on local exchange carrier deployment of SS7. Southwestern Bell plans to begin rolling out SS7 in Austin in March, but U S West's plans for SS7 in Minneapolis are longer term.

A Small But Loyal Following

There still are fewer than 150 ISDN subscribers in the United States. Many of the early users and biggest fans are companies developing ISDN products and applications.

For example, Teleos, which uses primary rate and basic rate lines, has developed its own terminal adapter to connect personal computers with local area networks via ISDN. At AT&T Network Systems, which has about 1700 basic rate ISDN lines in its St. Louis and Ballwin, Mo., offices, the computer aided-design group has devised a method of linking a plotter to all its users via ISDN and is looking at applications such as paperless fax and screen sharing for joint editing of presentation graphics.

Motorola Inc., which has lines from an AT&T 5ESS and a Northern Telecom DMS-100 central office switch at its Chicago ISDN lab, has developed an ISDN chip set. 3M, which is using ISDN for multiple call appearances on single-line phones, voice messaging, access to a private long-distance network and some computer links, sells a wide range of network cabling and connecting products. Kodak, Rochester, N.Y., which runs primary rate on a private network, is selling an ISDN still-video transceiver.

With ISDN still in its infancy, users are just now beginning to discover the full range of features and benefits it can offer. It is the non-telecommunications companies that make the most compelling case for ISDN because they have no proprietary interest in seeing the technology succeed. More of them are using ISDN every day, and many of the early users say they plan to add more lines, especially when additional features, applications and CPE become available.

For the most part, these companies and organizations use it for very basic applications such as PC-to-PC file transfers, modem pooling, printer sharing, managing bandwidth, voice messaging, screen sharing and coax elimination.

Advanced data applications on ISDN have been slow to take hold. Companies are not using ISDN to replace local area networks or other high-speed applications. "ISDN in its current basic rate form does not lend itself to high-speed LAN applications. We won't see that until we see some more primary rate devices," says R.D. Peterson, an advanced specialist in 3M's information services and data processing department.

> *It is ha[illegible] about [illegible]ings [illegible] and [illegible] pu[illegible] can be [illegible]ed by the types [illegible] and applica[illegible]*

"Our data use is fairly limited. We have some PCs that dial into headquarters," says Alasker of American Creditors Bureau. "But we expect in the next six months to do a lot more data such as file transfers between a host and a client machine. We will probably reallocate a couple of channels we use for voice in the morning to data in the afternoon."

Many users plan to implement more advanced applications in the next year, especially video applications.

Hardee's is considering installing a freeze-frame video camera in each restaurant to snap pictures "to find out who our customers are. Are they mothers with children? Are they construction workers? The camera would give the marketing people a lot of information," says Smith.

Johns Hopkins Health System in Baltimore is using about 400 basic rate ISDN Centrex lines now and expects to be using about 2000 lines by 1995, acco[illegible] manager of net[illegible] ISDN implement[illegible] kins is using [illegible] data traff[illegible] such [illegible] is con[illegible] In ad[illegible] tio[illegible] ca[illegible] image [illegible] techn[illegible] that wou[illegible]ians [illegible]nsmit radiog[illegible] be[illegible]n dista[illegible]sing pri[illegible]te ISDN [illegible] also in the [illegible]rks.

Alverno College is looking at video transmission to replace videocassettes to allow faculty to easily monitor and as[illegible] the per[illegible]ance of stu[illegible]he small [illegible]s college tested [illegible] on it[illegible]e rate lines and found [illegible]de-quate, but the cost [illegible] high.

"We've been pu[illegible]cassette carts around [illegible] for years. ISDN is [illegible] off carts and onto a [illegible]t it would take abou[illegible]et up two sites for ISDN [illegible]mission," says Frank M[illegible]ant vice president for [illegible]tions. "At that price, we do[illegible] worth it. The price of equi[illegible] would have to drop below $[illegible] for us to consider it."

The future of ISDN looks prom[illegible]ing, as more applications are deve[illegible]oped, equipment prices fall and ISDN islands are interconnected, users say.

The key to making ISDN pay off now, most managers agree, is to keep expectations reasonable, pinpoint specific areas where ISDN can solve a problem or improve communications and test everything thoroughly before cutting over to the new system.

"When you roll all the benefits together, for a small company it really has been worth it," says Porsche's Backe. "And I expect it to get even better as time goes on."

Telephony

Spring Outside Plant Issue

N INTERTEC PUBLICATION FEB. 12, 1990 INTEGRATING VOICE & DATA COMMUNICATIONS $3

DRIVING DOWN COSTS WITH FIBER OPTICS

Bell f Pennsylvania is using optically riven RSUs to serve growth areas

HACKERS ATTACK BELLSOUTH 911

Four men are indicted after year-long investigation

CN '90 HEATS UP D.C.

MCI makes international move, while Sprint keeps focus at home

MONDAY, FEBRUARY 12, 1990 Volume 218, No. 7

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS

Bell of Pennsylvania lowers its first optically driven remote switch unit into a controlled environment vault at Penn Center West office park near Pittsburgh. Cover photo by Associated Photographers Inc., courtesy of Bell of Pennsylvania

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The company's decision to narrow its focus to local loop fiber optic equipment is rewarded in financial growth

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By Albert U. Marson. Michigan Bell has it. Only specially designed lockable building entrance frames will do

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By Ken G. Eicher. The days of Dick Tracy and his two-way wristwatch videotelephone used to seem far away. Now Cincinnati Bell field technicians carry paperback book-sized computer terminals into the trenches

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By Harvey R. Furey. Using optically driven remote service units to serve high-growth areas has helped this telco to drive down costs as well

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By William B. Jones. Columbus, Ohio, is sprucing up for its Quincentennial Celebration in 1992. To replace its Broad Street Bridge, the city and Ohio Bell had to temporarily house some underground conduit runs. The result could be a splicer's dream—or nightmare

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By Gary A. Skinner. GTE Telephone Operations-North Area needed to prevent damage to its printed wiring cards during transport. Special carriers were the key

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In My Opinion

Let's do lunch

My hands are big and strong. They serve me well for using a wide variety of hand tools, pencils included. But they also are among the world's worst when it comes to functioning with the kind of coordinated dexterity needed for touch typing.

So with that kind of a handicap, how do I get by in this business? To tell the truth, I cope by using technological crutches. Tape recorders, personal computers, software programs and printers enable me to turn out good copy in the amount needed. Authors help out by sending me their manuscripts on computer diskettes so I don't have to retype them. With crutches like that, I don't have to be a top-notch typist. Twice in six years, however, I've had to upgrade my crutches.

I needed the upgrades to be compatible with new systems *Telephony* implemented, not because the old crutches wore out. What it boils down to is that just to stay in the game, I've had to shell out money for new hardware and software before fully depreciating the old. Each upgrade involved many hours spent wading through training manuals and pecking away at the computer keyboard to master new command sets and capabilities.

Don't get me wrong. I'm explaining, not complaining. Technological upgrades and employee training extract a similar toll from telcos, but on a grander scale. During a recent conversation with a manager at a major local exchange carrier, I learned that the LEC had significantly fewer employees today than in 1980, but was delivering 50% more hours of employee training now than it did 10 years ago. While he expected the company to trim its ranks further, he said projections for the 1990s indicate that annual hours of delivered employee training would increase at the same rate.

He was able to rattle off several factors that made more training necessary, including rapid technological change, employee turnover, transfers and promotions. But it was customer expectations, competition in the marketplace and emerging technologies that were at the top of the list.

He stressed that it takes training—lots of it—to provide employees with a competitive edge. "If this company and its employees can't provide its customers with world-class telecommunications services . . . and deliver them with the degree of professionalism customers expect . . . then the competition is going to eat our lunch," he explained. "It's as simple as that!"

I think he and his company are on the right track. Competition and rapid technological change are a worldwide phenomena. In my opinion, businesses and individuals that rest on their laurels had best be wary of offers to "do lunch." It could be *their* lunch that the offering party has in mind.

A few words of warning, however, to anyone with a greedy eye on the contents of *my* lunch bucket. For one thing, I work at updating my technical knowledge. Watch me at the upcoming SUPERCOMM '90/ICC '90 show in Atlanta. I'll be squeezing as much knowledge as I can from the technical sessions, exhibits and attendees. And, as I said earlier, I have big, strong hands. Make the wrong move and they might react.

L. Frank Brisk

Telephony

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INTERTEC

LETTERS

There's a flaw

I would like to respond to the letter in the Dec. 25, 1989, issue from Rafael Fermoselle of the U.S. Embassy in Buenos Aires, Argentina (page 17).

AT&T has filed revisions to FCC Tariffs 1 and 2 (Letter of transmittal number 1881) that will allow holders of AT&T Calling Cards to place 800 calls to domestic locations using its USADirect program. The cardholder will be billed for the international segment of the call, and the 800 service subscriber will pay for the domestic portion. The proposed effective date for the service was Dec. 18, 1989.

I see three limitations in the plan:

- USADirect is generally available from only 30 countries, with limited availability from 40 more countries—including Argentina—at only specially marked phones;
- AT&T will complete calls only to AT&T 800 numbers;
- The 800 number must be subscribed to cover area code 412 because AT&T's serving operator center is in Pittsburgh.

We have discussed these limitations with our local AT&T contacts, but have not been advised of any resolution.

Charles G. Gray
Communications Systems Engineer
American Airlines Inc.
Tulsa, Okla.

800 by a different name

The letter from Rafael Fermoselle may offer misleading information.

In his letter, he complains that "Overseas potential buyers cannot dial 800 numbers from outside the U.S." and goes on to cite other examples of how overseas toll-free numbers would be of use to U.S. business.

Mr. Fermoselle is correct to the extent that U.S. 800 numbers may not be successfully dialed from outside the U.S. (and, if the customer wishes, Canada). However, equivalent service, known overseas as Freephone service, is available. MCI has been offering the service for more than a year, but the service is not yet available from Argentina. However, MCI already provides the service that Mr. Fermoselle describes, albeit usually not starting with 800, from 14 countries, and the list is growing. As of today, U.S. business can—through MCI—obtain toll-free numbers in Australia, Belgium, Brazil, Denmark, France, Greece, Hong Kong, Israel, Italy, Japan, the Netherlands, Sweden, Switzerland and the United Kingdom.

Alan Garatt
Manager
International Public Relations
MCI International
Rye Brook, N.Y.

Please don't block the door

In the Jan. 15 issue, you reported the opposition of the American Association of Retired Persons and the Consumer Federation of America to changes in the Modified Final Judgment (page 3). I am not familiar with these groups or how influential they are, but it seems to me that they are doing their members a disservice by taking this position. Changes to the MFJ need to be made to open up competition and enhance services to maintain our competitive edge.

By restricting the local Bell operating companies to conduit-providing status only—as these groups suggest—competition is stymied. In the areas being served by local cable companies, has service, quality, variety of programming or price levels improved? As the amount of customer complaints received by the government show, they have not improved; they have no competition so there is no incentive to improve performance. Why would these two groups back a policy that limits their members' ability to choose? How can the BOCs, the main components of the network, be excluded?

AARP and CFA complain about the implementation cost of the new technology. If not now, when? Are we going to leave it to the next generation to bear the cost? Without implementation, the cost will not come down and development of new technology will be curtailed. The two groups endorsed the idea of having the customers use their home computers to access the services; this sounds elitist. Many network users do not have home computers, and why should they? The network should be accessible to anyone. There are terminals on hand and on the drawing boards that will make access to the network universal. The only problem is cost; without competition and deployment, the cost will not come down.

The only way to improve our network is by encouraging competition, and by establishing a coherent and sensible national policy. For this to be achieved, the MFJ must be amended to allow the BOCs into the arena, and let the marketplace decide who survives. The consumer should not subsidize an enterprise in the name of competition. Let the BOCs in.

Delio Vento
Associate Manager
Southern Bell
Miami

Correction

The article, "Finding a key to the market," in the Jan. 29 issue (page 23) contained an error in the second paragraph. The sentence should have said, "In 1989, it [the key system market] boasted 4.3 million in shipped stations and was valued at $990 million, according to the North American Telecommunications Association's 1990 *Telecommunications Market Review and Forecast.*" It incorrectly said, ". . . $4.3 million in shipped stations. . . . "

Tell us what you think!

Letters to the editor should be addressed to *Telephony* Letters, Telephony Division, Intertec Corp., 55 E. Jackson Blvd., Suite 1100W, Chicago, IL 60604; Fax: 312/922-1408. Letters should include the writer's full name, title, company name, address and phone number. Letters may be edited for purposes of clarity or space.

C4775-3

Complete SUPERCOMM Planning guide Inside

Telephony

AN INTERTEC PUBLICATION FEB. 19, 1990 INTEGRATING VOICE & DATA COMMUNICATIONS $3

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UPPORT YSTEMS PLAY CATCH-UP

New peater fault location technology ll help telcos keep up with T-1

TELCO RATES FALL AGAIN IN 1989

Rates have dropped by $2.72 billion in three years

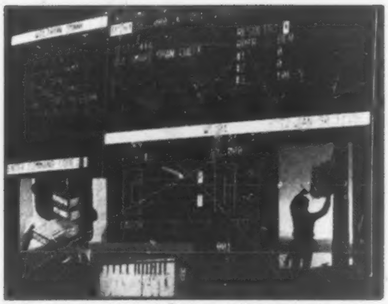
BELLCORE ACHIEVES ISDN LINK

Multivendor voice-data call is made using SS7

MONDAY, FEBRUARY 19, 1990 Volume 218, No. 8

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS



Across the United States, telcos are struggling to keep up with the demand for high-capacity services. New repeater fault location technology is helping telcos and their support systems play catch-up. Cover photos by John Benson, design by Harry Smallwood. Cover courtesy of Wiltron Co.

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Continuing a three-year trend, state regulators cut telephone company rates again

8 BELLCORE CLAIMS MULTIVENDOR ISDN LINK
Bellcore engineers achieved an ISDN milestone when they completed an ISDN voice and data call between AT&T's 5ESS and Northern Telecom's DMS-100 central office switches, using a DSC Communications Corp. signal transfer point

9 PROSPECTS DIM FOR MFJ REFORM THIS YEAR
It appears unlikely that a draft bill to ease Modified Final Judgment restrictions on the Bell regional holding companies will move forward this year, according to opponents and some supporters of the legislation

9 NYNEX CHARGED WITH OVERCHARGING
A Federal Communications Commission audit accuses Nynex's centralized purchasing and supply subsidiary with overcharging the RHC's telephone companies and earning an 80% return on its investment in 1988

10 GERMAN TELECOM NETWORKS TO INTEGRATE
Reunification of East German and West German telecommunications is moving forward quickly, with the joint introduction of new services planned for mid-March by the two countries' PTTs

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By Tim Decker. GTE Telephone Operations has approached billing in a new way, bringing order to the myriad long-distance and local carrier listings. The new method keeps both company and customer happy

24 SUPPORT SYSTEMS PLAY CATCH-UP
By Ed Elkins, Ker-Chin Chang and Walt Lobitz. Telcos are struggling to keep up with the explosion of T-1 services nationwide. Support systems can help them, with new repeater fault location technology

31 DISTRIBUTING THE DATA
By Donald R. Woodwell and Frank Groom. It's making more and more business sense for telcos to provide customers access to various data. But getting to data stored in different operations systems can be quite a problem

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In My Opinion

Hacking: Infantile or Infamous?

When I first heard of the Legion of Doom—the group of computer hackers whose mission is to electronically invade central office switches, reroute calls, steal computer data and share the wealth with fellow hackers—my initial reaction was, "How infantile!" Then I calculated that Robert Riggs and Craig Neidorf, two of the four hackers indicted, could spent 63 years in jail if found guilty. Their combined fines may reach $344,000. Clearly, what may have started as a juvenile prank has become deadly serious.

Riggs and Neidorf were indicted for stealing and electronically distributing BellSouth Corp.'s proprietary computerized text file program that controls and maintains the company's emergency 911 system. It handles emergency calls to the police, fire, ambulance and emergency services in nine states.

The threat of disruption, however, went beyond BellSouth's region and could have caused chaos nationwide. To make the program available to anyone with access to a computer bulletin board is either criminally irresponsible or is intentionally fostering anarchy.

Despite the ominous title Legion of Doom and code names like The Prophet and Knight Lightning, which sound like Steven Spielberg film rejects, I believe these hackers are simply irresponsible. Still, I would not let them off the hook easily. Their "illegal activities," according to the U.S. Department of Justice, included the rerouting of calls, stealing computer data and modifying credit histories, fraudulently obtaining money and property from companies by altering information in their computers, and disseminating information about attacking computers to other hackers to direct investigation toward other hackers and away from themselves.

Those of us who are not card-carrying members of the Legion of Doom are baffled over the cadre's motivation. There is more than one impetus for crime. During the French Revolution the phrase "criminals of want" was coined to distinguish those who stole to survive. Then there are those who steal to turn a profit. There is a rich history of seizing property to accumulate wealth. The motivation is clear.

As a child I went on a dart-stealing spree while my mother was shopping, just to see how good I was. I did it until I was caught, inspired by the suave Robert Wagner on the television series "To Catch A Thief." My motivation was the challenge.

I think these hackers also are motivated by the challenge. Like it or not, these are America's youth, members of a generation that might live in Miami, but not know where Miami is on a map. Whether they are gang members or legionnaires of doom, these youth need a challenge.

There must be solutions that go beyond imprisonment. I've always felt, for instance, that the solution to graffiti is to provide certain walls to serve as a stone canvas for would-be graffiti artists. Right now, Los Angeles corporations are allowing graffiti artists to paint on the sides of their office buildings. There may be a lesson here for the Bell regional holding companies.

The public network, as it becomes more computerized, is especially vulnerable to hackers. The hacker does more damage—and achieves greater glory—by bringing the likes of BellSouth to their knees. In addition to promoting stringent laws against hacking, telcos might offer some type of contest for hackers. Instead of breaking into a CO or database, hackers could pit their competitive energy against a model decoy system—distinct from the real system—that is just as difficult to invade. It still would be a challenge, but a legal one that wouldn't threaten lives.

Michael S. Warr

Telephony

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INTERTEC

Telco rates drop again in 1989; three-year total hits $2.72 billion

Dawn Bushaus, Assistant Editor

State regulators ordered major telephone companies to cut rates by nearly $839 million in 1989, marking the continuation of a three-year downward trend in rates, according to the Federal Communications Commission. The nation's telcos cut their rates by about $2.72 billion between 1987 and 1989, the FCC annual summary of state rate case activity indicates.

The FCC summary, released quarterly, reviewed 45 rate cases reported to the agency in 1989 by the seven Bell regional holding companies and three major Independents, Contel Corp., GTE Corp. and United Telecommunications Inc. In 32 of the cases, commissions ordered decreases totaling $863.4 million. In 13 cases, they ordered increases totaling about $24.9 million.

The three years of rate cuts follow three years of substantial rate hikes. Between the AT&T divestiture in 1984 and 1986, state regulators approved rate increases totaling $5.3 billion.

The trend in rate cuts is linked to the move toward alternative regulation currently taking shape in many states, said Audrey Stevoff, a vice president at Duff & Phelps Inc.

"Once these plans are put in place, I don't know that we'll see rate cuts, maybe just periodic refunds," she said.

In the past two years, 20 states have adopted alternative regulation. Currently, only five states are not considering new regulatory proposals, Stevoff said.

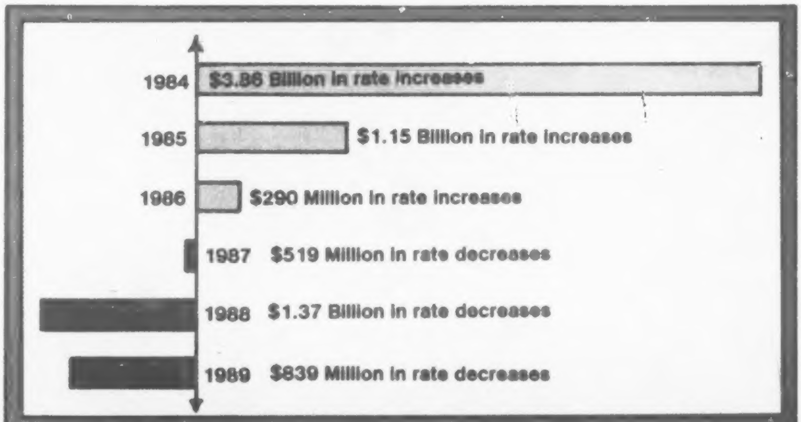
Kansas and Washington are the most recent states to adopt an alternative regulation scheme. The Kansas Corporation Commission recently approved Southwestern Bell's TeleKansas plan, and the Washington Utilities and Transportation Commission adopted U S West's incentive regulation plan along with a $65-million rate cut. In addition, Texas is considering incentive regulation (see story, page 15).

The agreements that telcos and regulatory commissions make in adopting alternative regulation plans often include a rate cut as a gesture of good will. "I guess you could call it an olive branch," Stevoff said.

Two of the largest cuts ordered in 1989 came as part of an incentive regulation plan. In December, the California Public Utilities Commission adopted an incentive regulation plan for Pacific Bell, but also ordered the telco to cut rates by $391 million. And in November, the Illinois Commerce Commission approved alternative regulation along with a $45.4-million rate cut for Illinois Bell.

The rate cuts probably will continue, Ringling said. But the telcos are likely to hold off on aggressive cost reductions in 1990 until the FCC has implemented a price-cap plan, he added.

Other large cuts in 1989 included a Texas Public Utility Commission order against GTE for $59.1 million, which the telco currently is appealing. In Colorado, a depreciation-based rate case last year produced cuts of $46.3 million for U S West Communications, then called Mountain Bell.



Source: FCC

POST-DIVESTITURE TELCO RATE FIGURES

Other factors contributing to the ongoing trend of rate decreases include network modernization and a stronger overall economy, Stevoff said. "In the early 1980s, there was rampant inflation and the telcos were in the process of modernizing their plant. The companies went in and sought hefty rate increases. At that time, we had to downgrade many of the commissions' ratings because they were not responding quickly enough," Stevoff said.

Another industry analyst agreed that the continuing changes in the regulatory environment and network modernization are shaping financial trends for telcos.

"Through digitization of the network and reductions in the work force, the telephone companies are now exceeding the rate of return. The regulatory commissions are quite justified in asking for cuts," said Fritz Ringling, a principal with Robert A. Sayles Associates.

Another factor that has driven telco costs down is the leveling off of the rate of plant depreciation, which increased in 1983 and 1984, Ringling said.

In addition, investigations of overearnings resulted in $35.4 million in reductions by South Central Bell in Louisiana and $33.4 million in rate cuts by U S West in Arizona. ■

Bellcore claims multivendor ISDN link

Michael Warr
Technical Editor

Bellcore engineers have spanned a crucial gap in integrated services digital network technology, completing an ISDN voice and data call between the central office switches of the two major switch companies over signaling system 7.

Bellcore linked an AT&T Network Systems' 5ESS and a Northern Telecom DMS-100 via a DSC Communications Corp. signal transfer point.

Before this breakthrough the protocols needed for establishing an ISDN call over SS7 were unavailable and the two

Telephony

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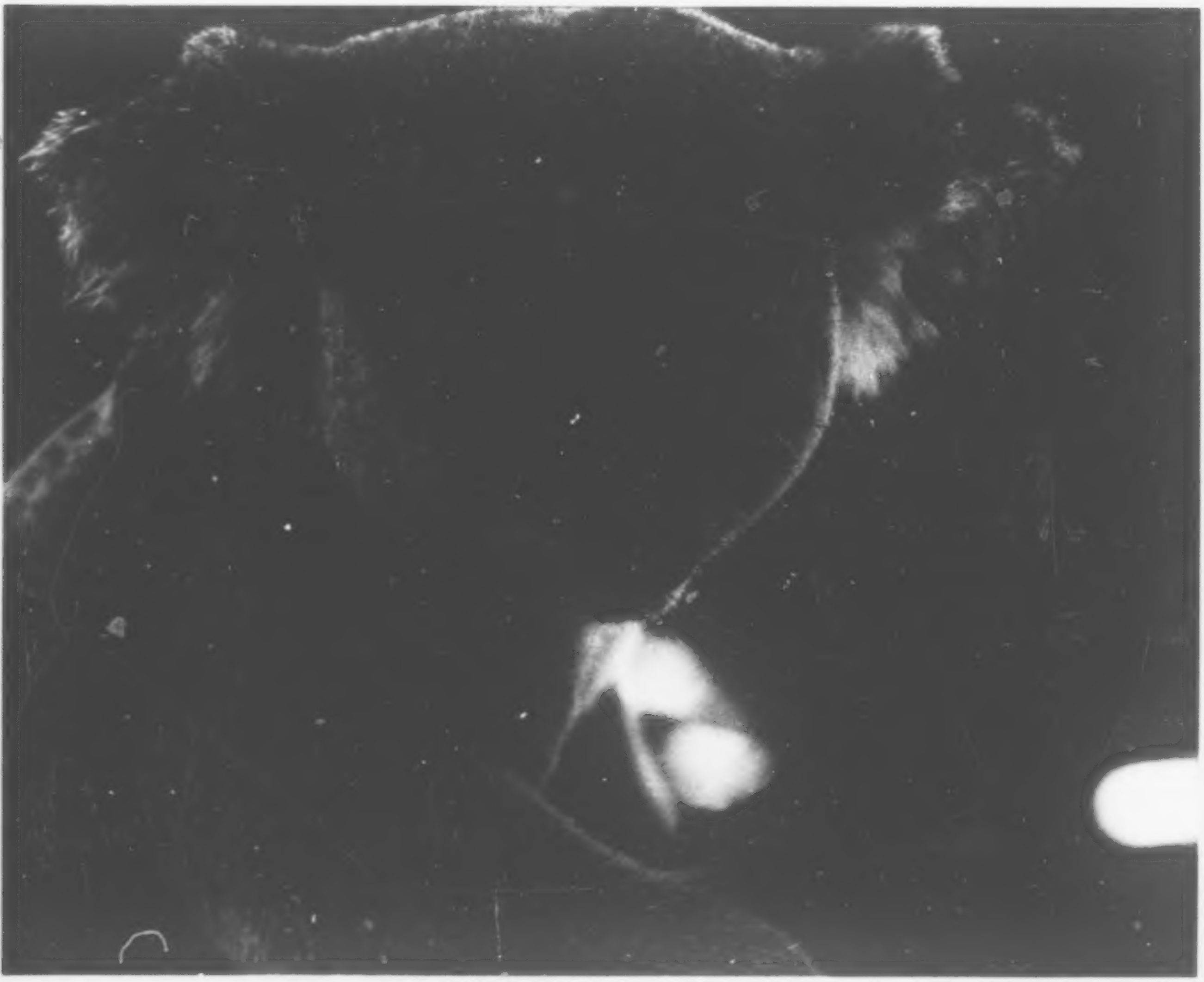

THROW ANOTHER PHONE ON THE BARBIE

Telecommunications Down Under is more complex than just saying g'day

[illegible]

FBI PROBES FTS 2000 ESPIONAGE

Ex-employees claim US Sprint spied on competitors to win contract

PUERTO RICO TEL GOES ON AUCTION BLOCK

Governor wants to sell island telco for $2 billion

MONDAY, FEBRUARY 26, 1990 Volume 218, No. 9

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS

Australia not only supports diverse and unique animal life, such as koalas and kangaroos, but it also must support diverse and unique telecom needs. Cover photo by Ira Block, Image Bank

NEWS OF THE WEEK

10 **FBI INVESTIGATES FTS 2000 ESPIONAGE**
The federal probe is prompted by allegations that US Sprint spied on its competitors to win part of the contract to build the massive government network

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The governor announces a plan to sell Puerto Rico Telephone for at least $2 billion and use the money for education and public services

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By Paul Travis. Australia, an island continent almost the size of the United States, supports diverse wildlife and geographical terrains. Like the Crocodile Dundee character, the country's telecom administration must live with both the sparsely and heavily populated sections

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In My Opinion

Grasping hands across the water

Earlier this month the telecommunications administrations of Singapore and Brunei agreed to a new accounting arrangement for traffic between their countries. Singapore Telecom will keep all the revenue generated by its subscribers calling Brunei, and Brunei Telekom Darussalam will do the same for calls to Singapore.

The apparently uncontentious nature of this "no-accounting" agreement may have been responsible for its passing without any banner headlines. The initiative is, in fact, highly controversial and may prove to be the opening shot in a conflict that could bring the whole edifice of international telecommunications accounting tumbling down like a house of cards.

The present mechanism for international traffic accounting essentially involves an equal division of call revenues. The originating country collects the revenue and reimburses the terminating country, based on volume.

Where there is an imbalance of traffic between two locations, the originator of the highest traffic volume suffers a net outflow of funds. While this may amount to billions of dollars—some observers put AT&T's annual shortfall at over $2 billion—it can at least be partially justified by the fact that the receiving network is used more as traffic volumes rise.

Things really start to go awry when one national operator modernizes a network and can lower the cost of service provision. In this case the number of outgoing international calls can be expected to rise against incoming volumes from less-modern operators.

As a result, the good guys are penalized. To avoid this situation, some international tariffs are kept artificially high and users lose out. Significantly, the main rationale for the initiative of Singapore and Brunei is that their customers will thereby obtain lower tariffs.

Changing the global system won't be easy, since many operators obviously have a vested interest in maintaining the status quo. Indeed, many in the developing world would rather see revenue imbalances in their own favor increased rather than eradicated as a way to provide additional investment resources for their local national network expansion projects.

Nor does competition in the form of additional carriers necessarily facilitate change. A country with several international carriers intent on undercutting each other risks coming off worse in any rate auction conducted with countries that have a single international carrier.

Despite this situation, change is surely coming. An OECD discussion document on the subject is currently making the rounds, and there are those campaigning for the inclusion of international accounting within the purview of the GATT. The push of user expectations allied to the pull of multilateral service liberalization, however, will be more potent than deliberations in such international arenas.

John Wil

Telephony

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INTERTEC

GTE, according to Fritz Ringling, a principal of Robert A. Sayles Associates Inc. GTE has the resources and cash flow to make a bid, as well as experience in Latin America, where it owns the Dominican Republic's local telephone company, Compagnia Telefonos Dominicana, Ringling said.

GTE would not comment on specific bid plans. "If indeed the privatization takes place, we will follow it with interest," a GTE spokeswoman said.

Foreign telecommunications companies may also show some interest in the telco. However, foreign ownership is limited to 20% under Federal Communications Commission rules, according to officials working on the sale. ■

Nynex Materiel accused again of overcharging

Charles Mason
Washington Editor

An audit conducted by the New York State Public Service Commission found that New York Telephone was overcharged between $25 million and $28 million for the removal of CO equipment by Nynex Materiel Enterprises Co.

The auditor's conclusion that New York Telephone's cost and project control during the equipment removal process were totally inadequate comes two weeks after the Federal Communications Commission also accused MECO of overcharging Nynex's two telephone companies by $118 million *(Telephony, Jan. 12, page 3)*.

In a related development, Nynex announced last week the formation of a venture that will sell office equipment and furnishings to its telcos and others. The business will be part of MECO, Nynex's centralized purchasing arm that provides equipment and supplies to New York Telephone and New England Telephone. State regulators said they would closely examine any intracompany dealings between the telcos and the new venture.

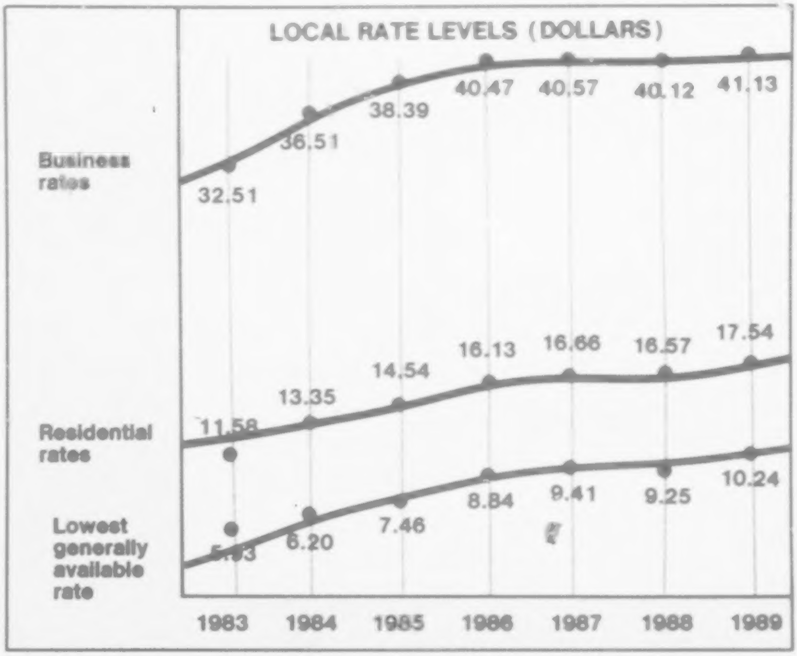
The PSC CO audit was sharply critical of the relationship between MECO and New York Telephone. The investigation "revealed a disorganized effort" that lacked management attention, overall coordination and the planning and oversight needed to minimize cost and maxi-

continued on page 14

Telephone costs decline 5% in '89

Charles Mason, Washington Editor

Rates for local telephone service moved slightly higher last year, but those increases were offset by a continuing decline in rates for long-distance service. After adjusting for the 4.6% national inflation rate, the real cost of telephone service actually fell about 5% in 1989, according to data released by the Federal Communications Commission.



Local rates were up 0.6% while the cost of interstate calling declined 1.3% and the cost of state toll calls fell 2.6%, the FCC said. Overall, the U.S. Consumer Price Index for phone service fell 0.3%.

The number of subscribers hit an all-time high of 87 million households, the agency said. An estimated 93% of all households have a phone, according to the U.S. Census Bureau.

On the long-distance side, more than 90% of the nation's telephone lines have been converted to equal access and more than 300 of the nation's 500 long-distance carriers now use equal access, the FCC said.

During 1989, rate reductions and refunds ordered by state regulatory commissions exceeded the dollar amount of rate increases granted for the third year *(Telephony, Feb. 19, page 8)*. In addition, there were few significant rate cases pending at the beginning of 1990, the FCC said.

The national average monthly charge for residential local service with unlimited calling was $12.28 in October 1989, the FCC said in a separate report. The total cost, including subscriber line charges and taxes, averaged $17.54 per month.

The average rate for the lowest-priced, generally available service was $10.24 per month, including subscriber line charges and taxes.

Businesses with one line paid an average of $41.13 a month for service, which included SLCs, tone dialing, taxes and 200 five-minute messages in areas where unlimited local calling was not offered. For multiple lines, businesses paid an average of $51.40 per line.

As for future trends, no significant increases in the cost of local service are expected during the next several years, the FCC report said. Noting that there are no major rate cases pending and that the SLC is not scheduled to increase, the agency said rates could actually drop in 1991 if the federal telephone service excise tax expires as scheduled. However, other tax considerations could force rates up slightly, the report predicted. But rates should increase at a slower rate than inflation, the FCC said. ■

Throw another phone on the barbie, mate

There's more to Australia than koalas, kangaroos and Crocodile Dundee. It is an island almost the size of the United States with unique telecom needs

PAUL TRAVIS, Executive News Editor

Don't let Crocodile Dundee fool you. There's a lot more to saying *g'day* Down Under than he would admit. The telecommunications industry in Australia always has faced unusual challenges in bringing service to customers, thanks in part to the diverse geographic nature of this island continent.

Australia has a land mass nearly the size of the United States and a rugged geography that ranges from blistering deserts and thick rain forests to beautiful coastal stretches and remote, uninhabitable outback regions. In addition to supplying sophisticated services to the six major cities that are home to almost 80% of the country's 18 million residents and most of its commercial enterprises, the industry also has to serve isolated sheep and cattle ranches and mining communities that depend on communications links as their lifeline to civilization.

Australia has taken the standard, worldwide approach to meet its challenges. It created three government-owned monopolies to provide telecommunications services: Australian Telecommunications Corp., the domestic telephone company commonly known as Telecom; OTC Ltd., the international carrier; and Aussat Pty. Ltd., the satellite service provider. These companies have provided one of the world's largest islands with widely available, reasonably priced, sophisticated communications services.

Today, however, the industry may be facing its greatest challenge: The introduction of competition and a new form of regulation into what has been a monopoly industry. Just how far Australia's socialist government intends to travel down that open road still is not clear, but the changes it already has implemented are the most dramatic and far-reaching ever.

This will be the year that the new regulatory agency gets down to business and tackles tough issues such as whether the government should license a second cellular carrier, what standard should be used for digital cellular and what approach to take on personal communications services such as CT2.

A New Face

Last June Australia adopted a new telecommunications act that rewrote the rules of the game for the telecommunications industry. The act created the country's first communications regulatory agency—the Australian Telecommunications Authority, known as Austel, to monitor and regulate the three major carriers, set technical standards and license competitors. It also opened several markets to competition, including inside wiring, most customer premises equipment and value-added services. And the government also implemented a price-cap plan for most services.

The new legislation brought cries of anguish from the carriers and harsh criticism from many users, especially business users who said the legislation didn't go far enough in promoting competition. They were particularly unhappy that the government would continue to restrict shared use and resale, and maintain the carriers' monopoly over a wide range of basic services.

But the government says users are too quick to judge.

"This is only the beginning, not the end of the process," says Vanessa Fanning, first assistant secretary in the telecommunications policy division of the Department of Transport and Communications. "Change will continue. We are in an evolutionary state. There is flexibility in the legislation so that the boundaries of monopoly can be redrawn."

The existing monopoly carriers still have the exclusive right to provide public switched voice, data, text and video services, integrated services digital networks, private-line services and mobile services. In addition, Aussat retains a monopoly over domestic satellite services and Telecom keeps its monopoly on pay phones. Customers still must obtain their first telephone set from Telecom until June 30, 1991, although they can buy additional equipment from other suppliers.

Australia is inching slowly toward competition because it wants to "avoid the specter of chaos and cost increases to consumers that we've seen in other countries. We want to do it in a managed way," explains Neil Primrose, assistant secretary for international policy in the DTC's telecommunications policy division.

How well Australia manages its telecommunications transition will be determined by the country's new regulatory czar. The man in the hot seat, Austel Chairman Robin C. Davey, describes himself as a facilitator, not a regulator. "Regulators stop things," he says. "We're here to make things happen."

But Davey also knows he must be careful about what he makes happen. "Telecom is the second-largest employer in Australia. Politicians have lost seats over telecommunications issues such as timed local calls and competition," he says.

Get Down

This will be the year that the new regulatory agency gets down to business and tackles tough issues such as whether the government should license a second cellular carrier, what standard should be used for digital cellular and what approach to take on personal communications services such as CT2. Although Austel has yet to make any major regulatory rulings, the new law and the agency have started to produce results, Davey maintains.

"Since July 1, key systems' prices have dropped 30%," he says. "The consumer is starting to see the benefits of competition. We've set standards for cablers and have issued some licenses. We expect to end up with 10,000. We also issued a class license for value-added services and now we have hundreds of VAS providers. We want to let people provide service without coming to the government and asking permission."

To Davey, a former lawyer, it is important that regulatory proceedings don't become an "adversarial process like in the United States. We don't want to become tied up in legalities. I've told companies, 'If you want to talk, come in and talk. But don't bring your lawyers.' "

The warnings haven't done much good, however. The U.S. tradition of fighting high-stakes regulatory battles with mountains of paper already has surfaced.

For example, cellular service is growing at 8% a month and should reach 200,000 subscribers by the end of the year. That dramatic growth has caused a lot of companies to urge the government to authorize a second carrier. Twenty-nine companies filed close to 2500 pages of submissions on the subject. Only those involved with Telecom, the monopoly cellular supplier, including its unions and its switch supplier, Ericsson, argued against competition. The largest

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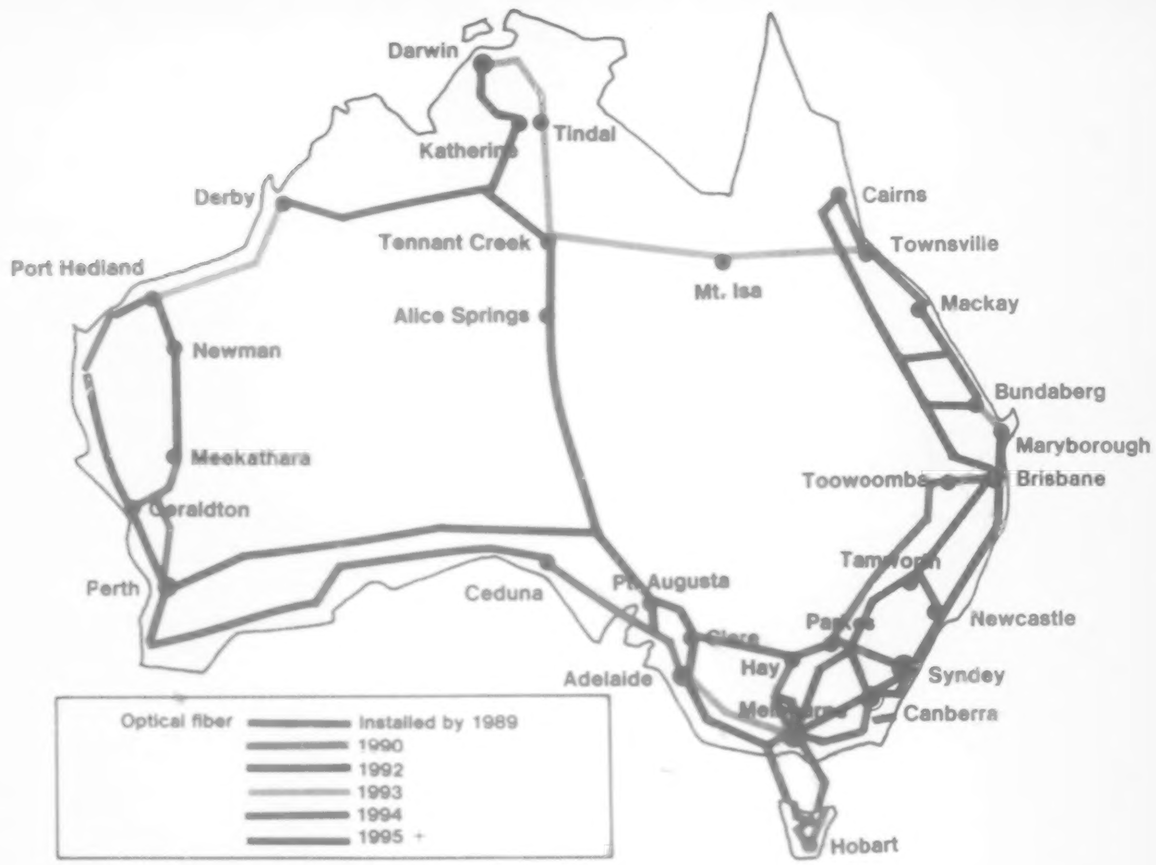
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Tindal
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Townsville
Mackay
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Meekathara
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Toowoomba
Brisbane
Geraldton
Tamworth
Perth
Ceduna
Pt. Augusta
Newcastle
Parkes
Clare
Hay
Adelaide
Syndey
Melbourne
Canberra
Hobart
Optical fiber
Installed by 1989
1990
1992
1993
1994
1995 +

FIGURE 1 TELECOM AUSTRALIA'S FIBER PLANS

Another Phone *continued*

filing—473 pages—was made by Link Telecommunications, a paging company that is 80% owned by BellSouth, Davey says. Austel expects to make a recommendation to the government on the issue by the end of March.

The cellular issue has even caused intramural squabbling among Australia's carriers. Aussat supports a second cellular license, and hopes its satellites will be used to create a new network to compete with Telecom, which owns 25% of the satellite carrier. Aussat is currently limited in the types of services it is allowed to offer, a limitation that has caused Managing Director Graham Gosewinckel to publicly complain that the company "has been subject to more regulation than any other industry or technology. The restrictions were aimed at ensuring that the satellite would be no threat to Telecom's monopoly position. Those regulations were put there and remain there to protect Telecom."

Besides dealing with the hot competitive issues, one of Austel's top priorities is to establish technical standards and develop reciprocal agreements with countries such as the United States, the United Kingdom, New Zealand and Japan so equipment approved in one country can be sold in others. "They're doing that in the European Community. If we can develop reciprocity agreements, it will help Australian companies sell overseas," says Bob Horton, general manager of Austel's technical standards division.

Australia's monopoly carriers dodged a bullet when the new telecommunications act reaffirmed their exclusive right to provide basic telecommunications services.

But given the growing demands by users for more choices and the developments in other countries, the three don't believe their monopoly will last forever. They are moving quickly to provide the latest in services with the most modern technology to pre-empt any competition that the government may authorize.

OTC, which provides international satellite and underseas cable links to 240 countries, is introducing ISDN, signaling system 7, high-speed data and virtual private network services this year. It is the largest investor in the PacRim underseas fiber network, which will link Hawaii, New Zealand, Australia, Guam and Asia.

"In the last few years, demand for services within our region has been booming. We act like we're operating in a much more competitive arena than we really are," says John N. Hibbard, manager of business development.

Aussat, which has about 100 earth stations providing service to remote areas, is banking on a high-powered L-band satellite scheduled for launch in 1992 to put it in the forefront of satellite-based mobile services. The new telecommunications act allows it to expand its private network services to New Zealand and New Guinea.

Officials hope that further liberalization will

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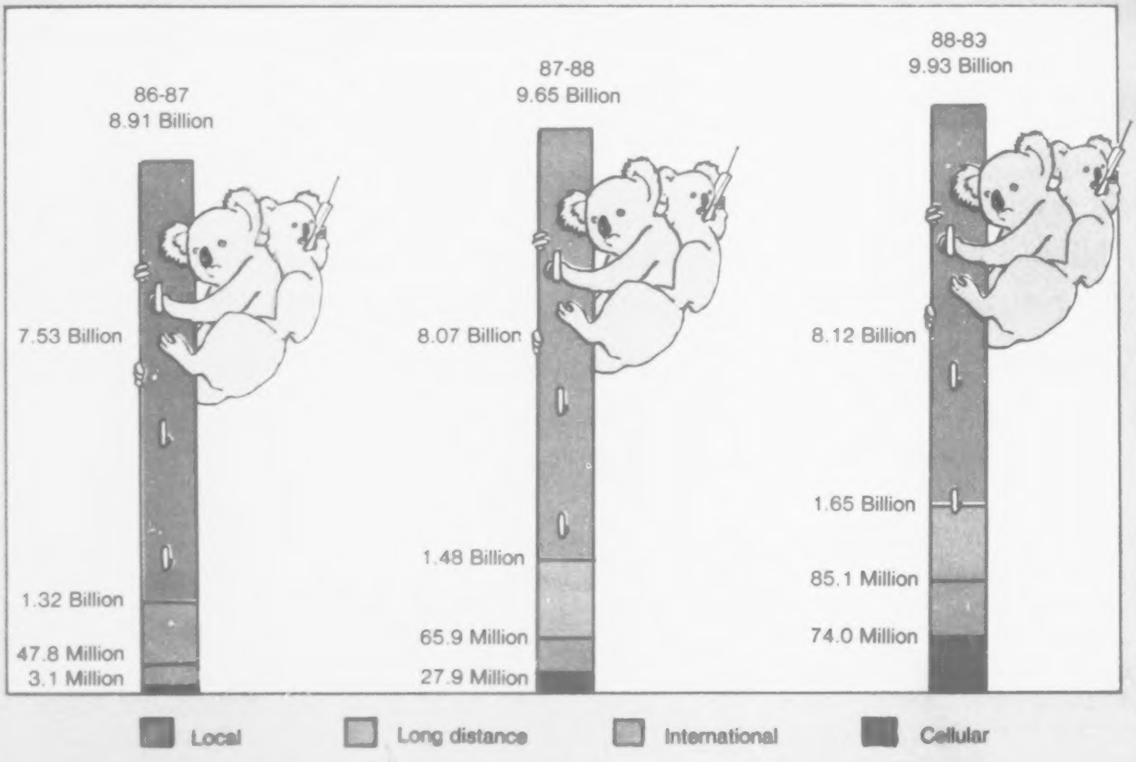

TELECOM AUSTRALIA TRAFFIC GROWTH (NUMBER OF CALLS)

Another Phone *continued*

allow the company, which primarily provides video transmission, to enter the public-switched services market, including nationwide paging and cellular service. "We are under-capitalized and limited in the markets we are allowed to serve. We would like wider access. We think we could make a real contribution," says Richard C. Johnson, Aussat's general manager.

Telecom has upgraded its network to the point that officials believe it rivals any in the world. On the transmission side, it has digitized its microwave network, laid fiber cables to link the major cities and is constructing a fiber ring that should encircle the entire island by 1995, according to Mike Hannagan, project officer in Telecom's network engineering department.

The telco has digital exchanges serving about 20% of its access lines. It introduced primary rate ISDN last year in eight network nodes and expects to have it in 30 nodes within a few years. About 30 businesses have signed up for primary rate ISDN service, including banks, utilities, engineering firms and computer companies. Telecom has implemented a nationwide SS7 network and has ambitious plans to introduce intelligent network services this year using Northern Telecom's DMS-100 switches. The company already is offering electronic white page directory service nationwide.

Having a monopoly on landline and cellular services has allowed Telecom to integrate the two to offer nationwide roaming services with an integrated national numbering plan.

The company also is financing research in leading-edge technologies such as fast-packet switching and artificial intelligence for network management. Because it doesn't manufacture equipment, Telecom is getting a lot of support and the latest technology from suppliers who believe Australia is a perfect market to test new services and products.

Gateway to a Gold Mine

The introduction of limited competition has made an already attractive market even more appealing to the world's major telecommunications companies, which have been supplying locally-made equipment to Telecom and OTC for use and resale for decades. The combination of an educated and skilled work-force and a stable political and economic environment has attracted more than 200 equipment manufacturers, including Alcatel, Ericsson, Fujitsu, GEC-Plessey Telecommunications, NEC, Northern Telecom, Philips and Siemens. They produce more than $1 billion worth of equipment each year and employ more than 12,000 Australians.

Until recently, supplying the carriers was the main business. And the Australian rules sometimes have produced unique results. Telecom, for example, decided to standardize its network on Ericsson's AXE central office switch and has become one of Ericsson's largest customers. But, because Telecom requires two suppliers for key network products, Alcatel-STC also builds AXE switches in Australia

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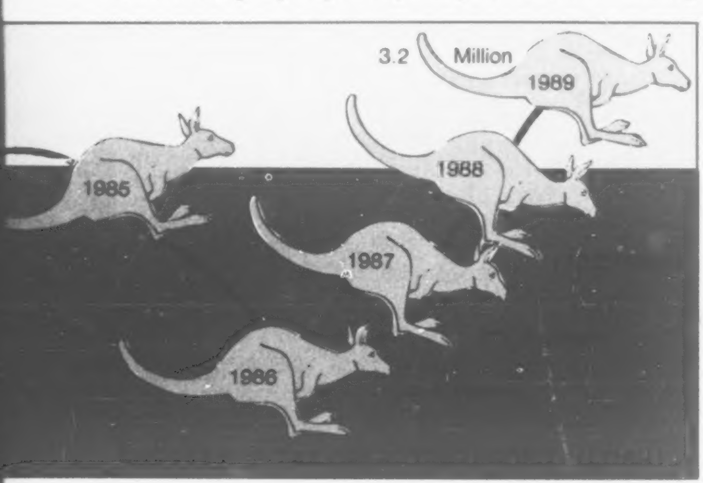
under license from Ericsson, and the companies compete for contracts. More than 2 million AXE lines are installed or on order in Australia, according to Ericsson. Alcatel has won half of the AXE switching business, and "we're still pushing Telecom to consider using the System 12," says Spencer Bell, Alcatel marketing director.

Many companies have benefited because Australia's carriers don't do their own manufacturing. NEC and Codan produce satellite equipment. Siemens manufactures lightweight transportable masts, towers and shelters for use in the country's remote regions. Northern Telecom supplies intelligent network technology to Telecom. Alcatel-TCC (Tasman Cable Company Pty. Ltd.) has just finished building a new $80-million plant to manufacture underseas fiber optic cables. Siemens and Jtec build ISDN protocol testers for Telecom.



The opening of the CPE market has created additional opportunities for PBX manufacturers such as Ericsson, Northern Telecom, NEC, Siemens, GPT and Fujitsu, and key system makers. Austel's Davey predicts that the large number of competitors will ensure that Australian consumers get the latest technology and the cheapest possible price.

In addition to the newly liberalized domestic market, there is another reason why major telecommunications companies are pouring money and resources into Australia, says Ken V. Loughnan, managing director of Telecom Australia International Ltd.

"We are the gateway to the Asian-Pacific market. The main growth area for the next 100 years is here, and we're the only fully developed country. Companies like Fujitsu, Ericsson and Northern Telecom are placing their headquarters in Australia to springboard into Asia," he says.

With a multibillion dollar trade deficit, the Australian government is doing everything it can to foster exports of high technology. One program has won commitments from 18 organizations and companies, including Ericsson, GPT and Northern Telecom, to spend hundreds of millions of dollars in research and development of high-tech products for export. The government also has set up an advanced electronics development center that has attracted funding from IBM, NEC, Siemens, Hewlett-Packard and a dozen other companies.

Leading the charge overseas have been the international arms of Telecom and OTC, which have achieved some success selling their network management and systems integration services internationally.

"TAI was three years old in October and we have a staff of about 200. We expected to do $3 million of business in 1989, but we're doing $50 million worth. We have 160 contracts in 32 countries," says TAI's Loughnan.

TAI's biggest success was winning a contract to manage Saudi Arabia's telecommunications network for the next three years, beating out Bell Canada, which held the contract for 10 years, and a joint bid from Deutsche Bundespost, Southwestern Bell and Swedtel, the international consulting arm of the Swedish PTT. TAI also has entered into several joint ventures with equipment manufacturers, including one with Alcatel to supply a fiber network to Pakistan and one with Ericsson to be the second switch supplier in Indonesia.

"Because of our successes," boasts Loughnan, "every major manufacturer has been through my door asking how they can work with us. And every major telco—including the Bell companies—has been through that door, asking the same thing."

OTC International has adopted an unusual approach in its aggressive effort to win overseas contracts: It offers countries a risk-free, profit-sharing deal. "We go in and build satellite facilities and then get a share of the profits to pay for it. The profits turn out to be pretty good in lesser developed countries," explains Daniel J. Maurice, manager, business networks and services.

That approach has proven especially attractive to underdeveloped countries that don't have much hard currency to pay for networks such as Vietnam, Cambodia and Laos. "After our dealings in those countries, we've been approached by a number of socialist countries, like Mongolia and Afghanistan. We expect to grow our $10 million operation to $300 million in five years. The South Pacific cries out for satellite solutions. After that, Eastern Europe and the Indian Ocean are next. We've even talked to the Bell regional holding companies about submitting joint bids," says Maurice.

Besides chasing business in its own part of the globe, the government's export drive has targeted the U.S., which some Australians jokingly refer to as the "Far East." As part of this effort the Australian Trade Commission will sponsor a booth at SUPERCOMM '90 to show off a host of products that it believes will appeal to American telephone companies and business customers. It will be the first time ATC has attended SUPERCOMM.

"We want the United States to know that there is more to Australia than Crocodile Dundee, koalas and beautiful beaches. We will be showing a wide range of products—from remote line testing equipment from Teletech to intelligent multiplexers from Scitec—that have been tested and proven in our own network," says Andy Fung, trade commissioner for the communications industry. ■

Telephony

AN INTERTEC PUBLICATION MARCH 26, 1990 INTEGRATING VOICE & DATA COMMUNICATIONS $5

DIVESTITURE, JAPANESE STYLE

There are different opinions about whether to break up NTT

MICHIGAN PUMPS PROFITS INTO NETWORK

Incentive plan allots some profits for construction

SECURITY CONCERNS HAUNT SOVIET FIBER CABLE

U.S. agency objects to U S West's role

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MONDAY, MARCH 26, 1990 Volume 218, No. 13

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS

A breakup of NTT is at hand. Divestiture, Japanese style, could be painted much different than divestiture, American style. Will it be a period characterized by touches of style, grace and efficiency? Cover art by James McKiernan

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TELEPHONY (ISSN 0040-2656) is published weekly for $35.00 one year, $60.00 two years. Outside U.S. $61.00 one year, $109.00 two years. Air mail for $165.00 for U.S.; $206.00 for Canada. Air Express one year outside U.S. and Canada for $125.00. Single copies $5.00 each (payable in advance); outside U.S. add $1.00. Subscription rates apply to employees of operating telephone companies; telephone consultants; contractors; interconnect companies; specialized common carriers; military; government; associations; private communications users; schools; libraries. Published by Intertec Publishing Corp., 9221 Quivira Rd., Overland Park, KS 66215. Second class postage paid at Chicago, IL and additional mailing offices. POSTMASTER: Send address changes to TELEPHONY, P.O. Box 12960, Overland Park, KS 66212. Copyright 1990 by Telephony Division, Intertec Publishing Corp. All rights reserved. Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Telephony for libraries and other users registered with the Copyright Clearance Center (CCC) provided that the fee of $1.50 per page is paid directly to CCC, 21 Congress St., Salem, MA 01970. Special requests should be addressed to publisher.

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In My Opinion

Mold-breaking In Fredericksburg

Fredericksburg, Va., may seem an unlikely birthplace for a whole new global telecommunications order, but many observers believe that a meeting hosted there last month by the T-1 Committee of the United States could make it turn out to be just that.

Participating in the first Interregional Telecommunications Standards Conference (ITSC) were the movers and shakers of world telecommunications standards-making. In addition to senior T-1 personnel from the U.S., the meeting drew the heads of Japan's Telecommunications Technical Committee (TTC), the European Telecommunications Standards Institute (ETSI), the CCITT and its radio counterpart, the CCIR.

What the assembled luminaries ostensibly did at Fredericksburg was to formally recognize that present international standards procedures are occasionally unfocused, sometimes out of touch with market realities, and often duplicated from one location to another.

They agreed that there is a need for the informal exchange of ideas in a timely fashion between national, regional and international telecommunications standards bodies in a new forum, namely the ITSC. They also proposed to lobby the International Telecommunication Union for more resources for the CCITT and CCIR, and said that the exchange of information between the various standards bodies would be greatly expedited by the establishment of a dedicated electronic information system.

More importantly, though, the meeting promulgated the so-called Fredericksburg Plan, which envisions standardization projects with well-defined objectives produced by specific deadlines.

It also lays out a general sequence of events: Standards bodies will convene periodically to advance global standards; ad hoc informal meetings for information exchange will be held; plans prepared at such meetings will be compared with the CCITT's work program; a subset of activities will be identified in terms of objectives, scope and timescale; and the CCITT and CCIR will use such data to set future program priorities.

The Fredericksburg agenda is laudable in as much as the greater involvement of users and manufacturers is implied in an accelerated standards-making process.

So far so good. Leaving aside the considerable logistical difficulties of organizing greater teamwork between the T-1, ETSI and TTC bodies, however, one might question the efficacy of any attempt to formalize cooperation between the CCITT's three main potential rivals in the world standards-making and implementation arena.

Admittedly, many of the Fredericksburg proposals were actually advanced by CCITT Chief Theo Irmer last year, and both his organization and the CCIR are probably intended to be "first among equals" in the future ITSC.

The temptation for some will be to regard the CCITT and the CCIR as part ITSC conscience, part compliant observer for the world's telecommunications "have-nots." Such a fate should be avoided at all cost.

John

Telephony

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INTERTEC

Asia's high-fiber diet

Southeast Asia is expected to be a global economic powerhouse in the 21st century, and the telecom network will play a major role. Fiber optics are, of course, a big part of the plan

JOHN WILLIAMSON, International Editor

Accompanying the remarkable economic and industrial achievements of the Asia-Pacific region in the last two decades have been ambitious plans to expand and modernize local telecommunications infrastructures. Initially, fiber played a minor role in this expansion.

In 1986 there were less than 100,000 optical circuits in use throughout the region, according to Pyramid Research Inc. The research firm estimates, however, that by the end of this decade, just 10 countries in the region will be using at least 1.3 billion fiber circuits.

In deploying fiber optic technology, many of the Asia-Pacific countries have several advantages not always present elsewhere.

Distances between national and regional population centers are often considerable, a circumstance that favors the long-haul economics of fiber. With the exception of Japan, in many parts of the Asia-Pacific region, copper-based telecommunications infrastructures are not mature or pervasive and there is little economic or historic commitment to copper.

A relatively late start in the commercial use of the technology provides some of the Asian countries with the opportunity to leapfrog earlier generations of fiber and reap the benefits of the longer repeater spacing and higher bit rates of systems now appearing on the market.

Finally, the region's involvement with fiber coincides with a substantial worldwide growth in demand for international bandwidth-hungry services such as very high-speed data, videoconferencing and computer-aided design/computer-aided manufacturing.

If the Asia-Pacific fiber market is booming, it's also relatively open. Notwithstanding the technological muscle of Japan, and indigenous efforts in locations such as Australia, China, India, South Korea and Taiwan, non-regional suppliers have played a major part in building the market and are expected to continue to do so.

James McCarthy, a fiber optics industry specialist at the U.S. Department of Commerce, points out, for example, that, although India intends to emphasize domestically produced hardware, Siecor has supplied cable and interconnect equipment for a $10-million system linking New Delhi and Bombay.

Right now there are no particular suppliers that dominate particular routes or operators. Even with the long-haul, sub-sea systems that are beginning to crisscross the Pacific, there appear to be less of the political preferences seen in the North Atlantic underwater cable business.

The proliferation of sub-sea optical systems in the Pacific Rim is an indication of the international importance of the region. In the same way, the most recently planned routes indicate a shift in local priorities and the growth of intraregional interests.

The first operational optical trans-Pacific system, TPC-3/HAW-4, reflects the historic U.S.-Japanese orientation of regional commerce. The 3 x 280 Mb/s system joins Japan and Guam to the California coast through Hawaii.

The U.S.-Japan communications axis remains important. For example, the private enterprise North Pacific Cable system will provide the first direct fiber link between Japan and the continental United States. The 8300-kilo-

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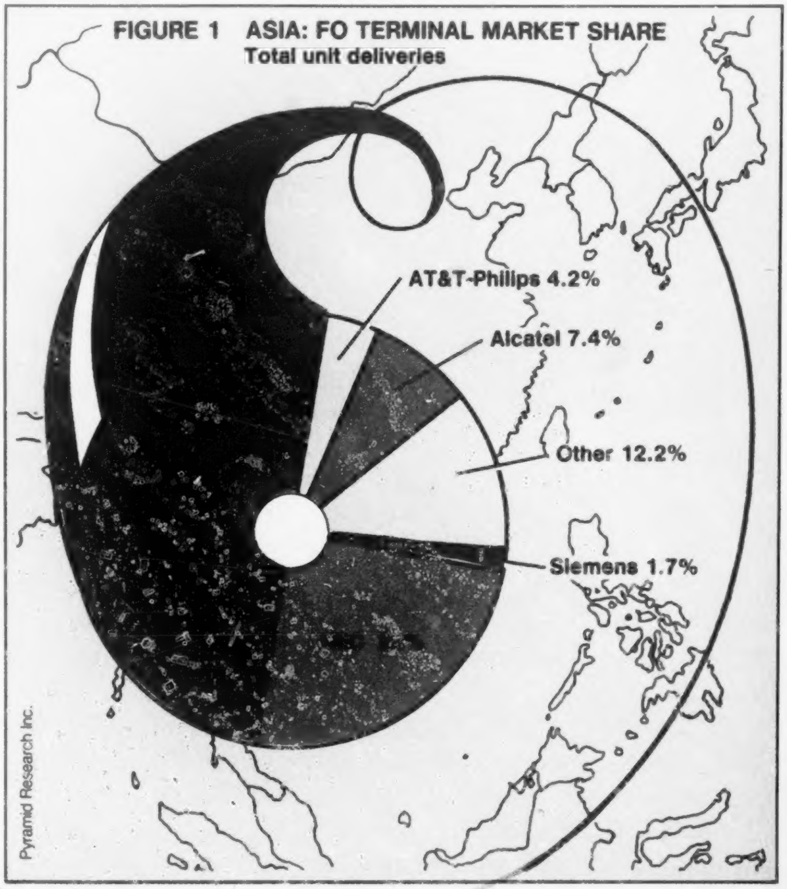


FIGURE 1 ASIA: FO TERMINAL MARKET SHARE
Total unit deliveries

Pyramid Research Inc.

meter NPC, which is scheduled for cutover later this year, will run at 1.26 Gb/s, a 50% capacity increase over the original plan. And it will have a 420-Mb/s underwater spur to Alaska. TPC-4, a $373-million public system, will run from Japan to Point Arena, Calif. TPC-4 is scheduled to begin service in late 1992, and reports suggest that capacity on the 1.55-micron cable is already fully booked.

Two other planned long-haul systems, PacRim East and PacRim West, signal some modification in the balance of regional interests. The first, scheduled for operation in 1993, will run from Auckland, New Zealand, to Hawaii. The second, three years later, will link New South Wales, Australia, with Guam. Both PacRims will then feed into TPC-3/HAW-4, reaching Japan in the East and California in the West.

Should it ever be built, a 13,500-kilometer trans-Siberian system (TSL) will mark a radical departure from traditional Pacific Rim telecommunications traffic and interest patterns. Running to the North Pacific coast of the Soviet Union and having spurs to Scandinavia, West Germany and Italy at its Western end, the $500-million system is being proposed by a consortium made up of U S West, the Soviet Ministry of Posts and Telecommunications, Deutsche Bundespost Telekom, British Telecom, Kokusai Denshin Denwa of Japan, Stet of Italy, OTC of Australia, and Denmark's PTT and Great Northern Telegraph Co.

If the TSL gets the go-ahead from the Paris-based Coordinating Committee on Multilateral Export Controls, and mutually satisfactory ownership and financing arrangements can be agreed upon between the participants, the system could be carrying traffic by the mid-1990s.

At that point it may face competition from a proposed $600-million sub-sea system currently being considered by France and Singapore. Running westward across the Indian Ocean before turning north into the Red Sea and into the eastern Mediterranean, the so-called Southeast Asia/Middle East/Western Europe 2 (SEA-ME-WE 2) cable will link Singapore and France.

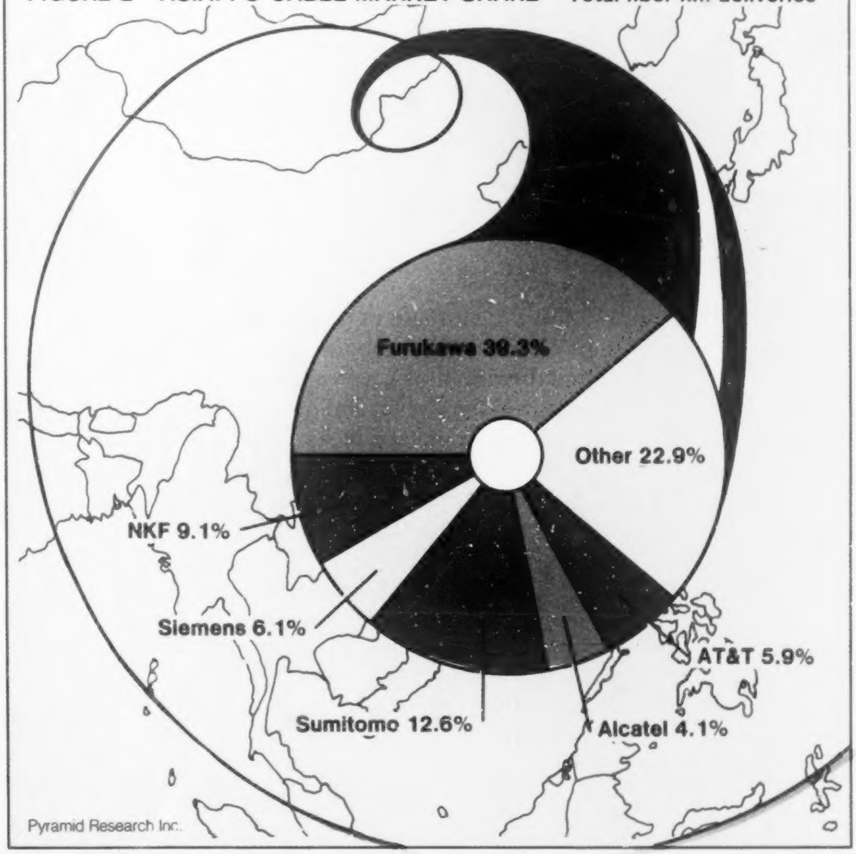
NTT demonstrates the light fantastic

Earlier this year Nippon Telegraph and Telephone Corp. announced a successful 2223-kilometer coherent optical transmission experiment using an erbium-doped fiber amplifier that employed direct optical amplifying technology.

In the experiment, 25 of the all-optical amplifiers were placed at approximately 80-kilometer intervals in the 2223-kilometer fiber, and optical signals of 2.488 Gb/s were successfully transmitted.

This technology could have a major impact on the configuration of NTT's telecommunications network, making it possible to directly connect all major domestic cities, whether by land or undersea cable, without converting to electric signals as in conventional amplification. Further development of the technology should enable direct transmission over distances greater than 10,000 kilometers—such as right across the Pacific Ocean.

FIGURE 2 ASIA: FO CABLE MARKET SHARE – Total fiber-km deliveries



Pyramid Research Inc.

However, recent reports suggest that an analog coaxial cable predecessor, SEA-ME-WE 1, has not been an unqualified commercial success and that France is now lobbying to join the would-be trans-Siberian operators.

Apart from long-haul, an explosive growth of shorter range optical sub-sea systems in the Pacific is indicative of the growth in the interdependency of local economies. Included are planned links between Guam, the Philippines and Taiwan; Hong Kong, Japan and Korea; Singapore and Brunei; Singapore and Hong Kong; Hong Kong and Taiwan; Hong Kong and the Philippines; and Australia and New Zealand.

Public and private terrestrial filter networks are multiplying at the back of these sub-sea systems.

In Australia, around 100,000 fiber kilometers of interstate trunk links, together with a slightly higher total of intrastate and metropolitan systems, had been installed by the spring of 1989. A major addition was recorded toward the end of the year with the commissioning of a 2617-kilome-

continued on page 46

ter link between Perth and Adelaide.

Overall, Telecom Australia is embarking on a massive trunk scheme to link all the major urban communities, including Hobart in Tasmania, with fiber by the middle of the decade. By 1989, in addition to the Perth-Adelaide system, Melbourne, Canberra and Sydney had been joined in a southeast coast network, and most of the distance between Adelaide and Darwin in the far north had been fibered.

Private fiber systems also are increasing in number, with one of the most recent being built for the Australian National Railroad between Port Augusta and Kalgoorlie.

The deployment of terrestrial fiber and the involvement in underwater systems—the international carrier OTC is the largest shareholder in the PacRim project—has fostered the growth of local manufacturing. A notable venture is between Alcatel's Australian and Submarcom subsidiaries, OTC and Telecom New Zealand.

Optical and fiber research and installation techniques have also prospered. The University of Sydney, for example, is gaining an international reputation in specialized fibers, while the installation of Telecom Australia's Perth-Adelaide link accelerated the development of a zero tension plough that ploughs and lays fiber cable in one action.

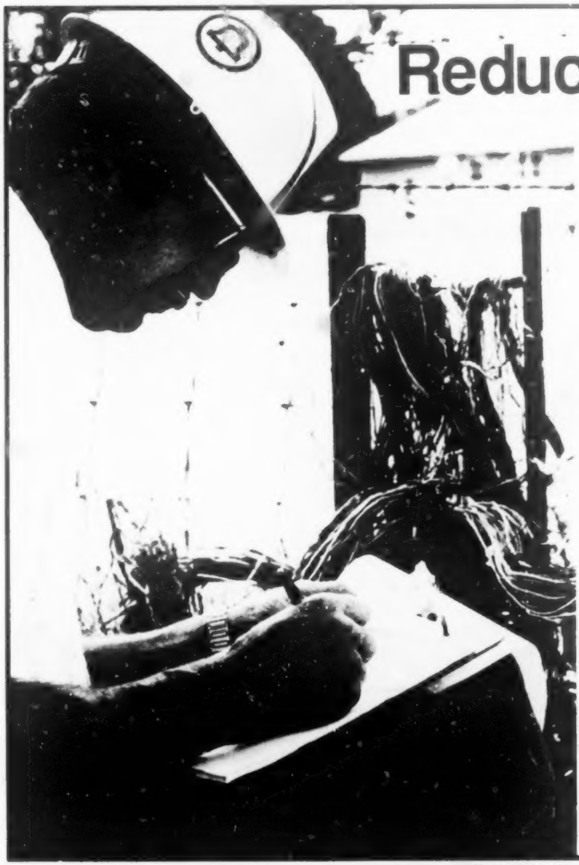
China also is building up an indigenous fiber industry. A current estimate is that local production will reach 300,000 fiber kilometers by the year 2000, although fiber quality has not been very good in the past.

Research and development carried out at more than 70 Chinese centers has established expertise in areas such as coherent laser sources and optical switches. Many field trials of locally designed transmission systems have been carried out since the early 1980s, with several beginning service.

In 1989, AT&T established a joint venture with a local partner in Shanghai to build, sell and service lightwave communications systems. And overseas suppliers, including GPT, STC, Philips, Nokia, SEL, Furakawa, Telettra and Pirelli, have been involved in the construction of public and private systems. Both AT&T and GPT have participated in the major project to link Hong Kong, Guandong, Macau and the Pearl River Delta in a ring-shaped digital fiber network.

Hong Kong began to lay optical fiber cable in its junction network in 1981. At the end of 1989 this network contained 22,000 fiber kilometers in 900 route kilometers of cable.

India's involvement with lightwave communications stretches back to the early 1980s with the use of multimode systems. Its five-year public telecommunications plan, which ends this year, sees the deployment of fiber in and between such major centers as New Delhi, Calcutta, Bombay



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and Madras. The emphasis is on locally produced hardware. The Indian railroad is a major private user of fiber.

Japan leads the region—and in some particulars, the world—in the development of lightguide technology. NTT completed a nationwide 400-Mb/s trunk fiber backbone in the mid-1980s. This backbone has been extended with 1.6-Gb/s links, and a variety of higher-speed systems are being looked at, with widespread transmission at 2.4 Gb/s as a possible long-term aim. Fiber also will play a big part in NTT's integrated services digital network plans.

The additional opportunities opened up by local progress in new technologies such as fiber, in the view of NTT Executive Vice President and Representative Director Eisuke Kusaka, were partly responsible for the appearance of competitive Japanese carriers after 1985. The new carriers have repaid the compliment, with both Teleway Japan and Japan Telecom building 400-Mb/s trunk fiber systems along the Tokyo-Osaka-Nagoya corridor and sparking a long-distance price war with NTT.

Japan continues to dominate many areas of international optical research and development (see page 52). In parallel, manufacturing has gone from strength to strength. In the latest complete figures available for the fiscal year that ended March 31, 1989, the Japanese Optoelectronic Industry and Technology Development Association (OITDA) indicated that domestic production of optoelectronic equipment had risen 20% over the previous one-year period. Connectors, couplers, isolators and other fiber optic components showed increases, as did systems for public and private networks.

Singapore, which has so far imported the majority of its capital telecommunications plant, had 10,000 fiber kilometers of lightwave systems in use in early 1989.

In South Korea, a 45-Mb/s system was developed in 1985 and a 90-Mb/s system the following year. The former is currently used to carry the country's long-haul domestic traffic. Speaking at a conference in Singapore in 1989, Shin Yun-Sik, vice minister of communications for South Korea, said that in the next five years a main priority would be to develop and install single-mode systems at 565 Mb/s and 2.26 Gb/s. Schemes to run sub-sea fiber along the coast of South Korea and across to China also have been reported.

In Taiwan, optical transmission is being progressively implemented in the junction network and has been used in videoconferencing systems. A reported priority is the introduction of synchronous optical network technology.

Investment in modern telecommunications technologies such as fiber optics is both the cause and effect of expanding economic activity. This may be a truism, but nowhere is its validity better exemplified than in the Asia-Pacific region.

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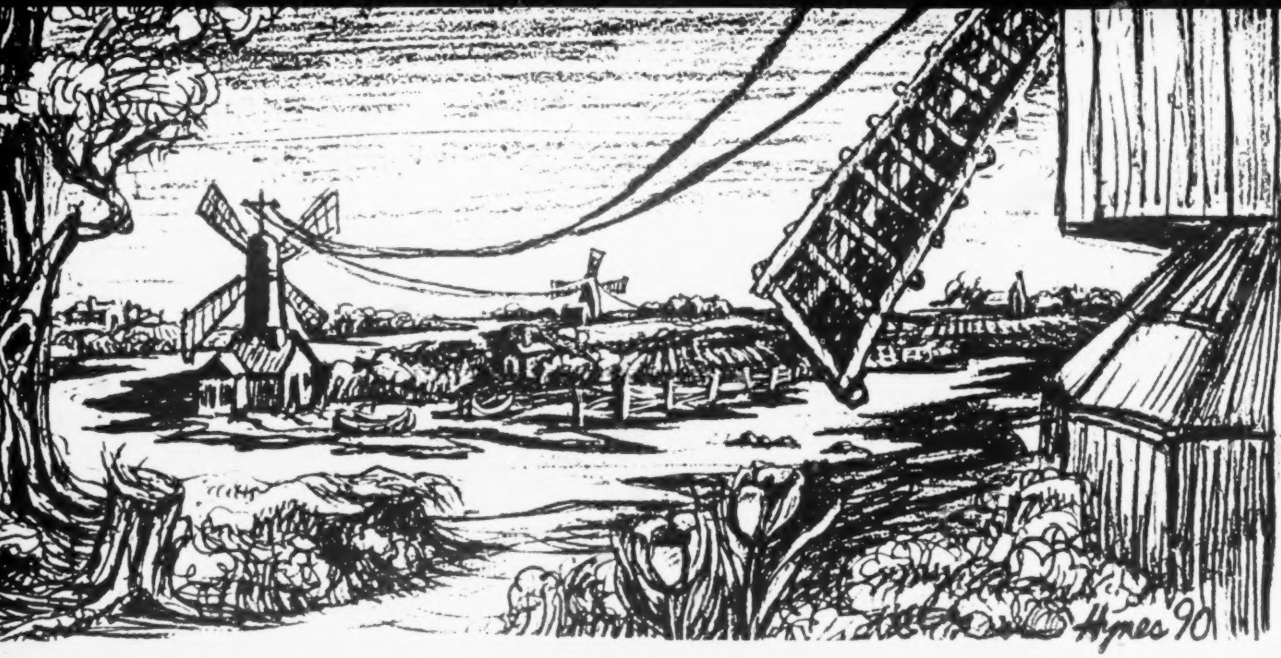

The Dutch solution

The telecommunications market in the Netherlands combines competition with its traditional PTT monopoly to serve an internationally inclined populace

JOHN WILLIAMSON, International Editor

In the time that it takes to read this sentence, telephone users in the Netherlands will make 60 international telephone connections. In 1990, the entire population of 15 million people will probably generate a staggering 200 million overseas calls.

The international orientation of the Dutch economy and society clearly has played an important part in shaping the new liberalized telecommunications regime that has been in operation for a little more than one year.

"The aim of the reorganization was to allow as much competition in as many fields as possible, given the size of the Dutch market and the constraint that the Netherlands, being an internationally oriented country, has to be assured of a network capable of competing with any network in the world," says Dr. Ben Verwaayen, one-time ITT Corp. executive and now president of Royal PTT Telecom Nederland NV.

A second major influence was the conviction that competition with the PTT would best flourish in the value-added services sector where market entry would be possible without huge preliminary investments in infrastructures.

"We concluded that value-added services were the most important because they would allow all kinds of new initiatives," says Verwaayen. "If you look at the first year, I think we were right. There has been an explosion of new, small enterprises offering a wide variety of services focused on product/market combinations and special applications."

The so-called Dutch solution to the problem of reconciling the competing claims of telecommunications monopolists and free marketeers was formally inaugurated Jan. 1, 1989. The new regime separates the postal and telecommunications functions into PTT Post BV and PTT Telecom BV. Regulatory power is exercised by a department within the national Ministry of Transport and Public Works. Although PTT Telecom is now completely owned by the Dutch government, during the next five years a large part of the company will be sold to the general public.

The new regime separates the postal and telecommunications functions into PTT Post BV and PTT Telecom BV.

From an operational point of view, PTT Telecom retains a monopoly on telephony, telex and data, and the transport thereof, under the terms of a 30-year concession. Competition is permitted in the provision of value-added services and customer premises equipment. In certain other cases such as community antenna television independent service providers are licensed.

Although there is no official desire to dismantle PTT Telecom's basic service monopoly right now, the new regulatory arrangements will not allow the organization to cruise through the 1990s on automatic pilot.

First of all, competition could be introduced in the reserved areas if PTT Telecom fails to meet its service obligations. Verwaayen takes this threat seriously.

"We have to file reports on dozens of performance issues and we are measured against those," he points out. "We have to meet cer-

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tain milestones regarding performance in relation to the customer, availability and reliability. I'm confident that we will exceed these requirements in many ways. In the cases where we fail, the government can take drastic measures."

Second, while PTT Telecom derives its authority from Dutch law, its power could be modified by European Commission (EC) rulings.

A case in point is basic data communications, which right now is reserved for PTT Telecom. At an EC meeting in late 1989 it was decided that independent service providers could be licensed in most European countries from the beginning of 1993. In practice, Verwaayen doesn't see much scope for competitors obliged to meet the same national service availability and performance criteria as his own organization.

"Maybe there will be, but under the same terms and under the same conditions as we have," he says. "So I feel comfortable with the idea of other parties doing the same." Nevertheless, the possibility of encroachment onto the reserved services does exist.

Again, competition in the Dutch value-added sector does not have to be simply a case of Big Brother versus a collection of Tiny Tims. As well as small local concerns, large overseas telecommunications operators may identify and exploit commercial opportunities in the Netherlands. Verwaayen is reconciled to this eventuality as long as opportunities are available overseas to PTT Telecom.

The most important obstacle to institutional complacency, perhaps, is the attitude and corporate culture of PTT Telecom. Verwaayen and his colleagues say they are determined to rescue customer service from the cliche status it has elsewhere.

"We don't sell technology, we don't sell hardware, we sell service," says Verwaayen.

In this context, the Dutch may have an intrinsic advantage over their European counterparts who also recently have experienced deregulation and liberalization. Historically, the telecommunications business of the Dutch PTT was not operated by a traditional government bureaucracy.

"The market and process orientation was not a bureaucracy in the sense of a government bureaucracy," claims Verwaayen. "We have had to be meaner and leaner than we were before, but basically the market orientation, the methodology of thinking, was already there."

Indeed, Verwaayen sees positive benefits arising from the modifications to the former monopoly. "We had to rethink our basic strategy, which was a healthy process," he says. "New opportunities were there to discover the basic needs of the customers and their perspectives and perceptions of what services should be, which are not necessarily the same as technical perceptions."

Under the new telecommunications regime, Dutch subscribers have witnessed a steady reduction in tariffs—up to 30% in some sectors—while service options have multiplied. There has been an early start in intelligent network services, the world's first pilot commercial international integrated services digital network service with West Germany in October of 1989 and, earlier this year, the trial of a 900-MHz prototype of the digital European cordless telephone system in a public service.

These initiatives are not just services for the sake of services. Offerings such as ISDN have to be justified by market demand.

"Sometimes you have the feeling that people are talking about ISDN in isolation from the marketplace," notes Verwaayen. "I don't like that. ISDN is a breathtaking opportunity, but only based on market demand."

Nor does PTT Telecom indulge in new technology for the sake of new technology.

"New services do not necessarily have to mean new technologies. It is sometimes surprising what existing technologies offer, what you can do with them and how you can make them more attractive," argues Verwaayen. "Many people think about new services only in terms of new technologies and new investments. We invest something like 40% of sales, and in my book that's a very high figure that I would like to see go down a little bit."

Not all of PTT Telecom's ventures have been runaway successes. The ill-fated, one-stop shop Managed Data Network System (MDNS), which was to have involved many of Europe's PTTs, was a Dutch initiative. Verwaayen

PTT fact file

PTT Telecom BV, a subsidiary of Royal PTT Nederland NV, has five separate business units: national networks, business markets, international telecommunications, consumer markets, and telematics, systems and services. Its main equipment suppliers are Philips, AT&T Network Systems International, LM Ericsson, Alcatel and Krone.

Employees: 29,000

Investment in telecom infrastructure in 1989: $2.7 billion

Profits in 1988 (estimated): $600 million

Telephone subscribers (main lines): 6.5 million

Lines in 1989: 7.2 million

Exchanges: 1330

Traffic: 6.4 billion inland calls, 186 million international calls, 28 million outgoing mobile telephone calls

Public call boxes: 6800 (plus another 1100 public phones) blames its failure on the number of participants and their diversity. MDNS was a CEPT approach that involved 23 different PTTs.

The Netherlands has begun to negotiate deals with individual and small groups of overseas operators, including France Telecom, Deutsche Bundespost Telekom, Telefonica, British Telecom and Singapore Telecom. One of the first major achievements will involve France Telecom and Deutsche Bundespost Telekom in an electronic data interchange network for the European transportation industry.

Similar initiatives in the future may involve non-PTT organizations, although whether PTT Telecom will follow the example of its West German counterpart and try to deal with IBM is not known.

The coming years also should see new developments in mobile communications. Two Inmarsat coast earth stations currently under construction are scheduled for completion in the fourth quarter of this year and are being equipped to handle A-, C- and the forthcoming all-digital B-standard traffic. This development will allow PTT Telecom to provide new mobile services in the Atlantic and Indian Ocean regions, as well as long-distance land links for trucks and other vehicles throughout western Europe.

Personal communications also will be emphasized in the future, although the form it will take has not yet been resolved.

"I would say that in the mobile markets, personal communications is the winner in the future," says Verwaayen. "But I'm not convinced we have the right solution yet to make it happen for everyone."

PTT Telecom's mission in the 1990s is to be a leader in the provision of new demand-led services, in partnership with others where appropriate, and to operate its remaining monopoly in a responsive and responsible manner. "Monopoly as a concept by itself is only good when it is operated as if there is competition," says Verwaayen. ■

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Telephony

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AFFORDABLE FIBER FOR FARMERS

SW Bell is ready to bring fiber—and digital service—to rural Texas

SW BELL ADMITS COST ALLOCATION ERRORS

Telco audit finds improper lobbying costs in rate base

GTE PULLS FUNDS FROM AG COMMUNICATION

Program to develop ISDN for GTD-5 switch is canceled

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INTEGRATING VOICE & DATA COMMUNICATIONS

In the past, when you were surrounded by plowed fields as far as the eye could see, you probably wouldn't be harvesting the benefits of single-party digital service. But Southwestern Bell may be changing that scenario in southeast Texas. Cover photo by Kristin Zhivago

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conceived, GSM uses large databases, known as home location registers, visitor location registers and equipment identity registers, to track users and route calls accordingly.

In the initial stages of GSM deployment, the Tekelec MGTS can provide manufacturers with the ability to emulate various network components, monitor network performance and test configurations, says Hess. Ultimately, it can provide carriers with the ability to test protocols and conduct system-level tests of multivendor networks, he says.

The advanced SS7 applications for the MGTS and MATE systems enable those systems to simulate complete SS7 trunk setup sequences, including trunk performance. **T**

Few surprises in earnings reports

Paul Travis
Executive News Editor

The first quarter earnings reports of local and long-distance carriers show continued strength in the interexchange and cellular markets, but little growth in the provision of local phone service when compared to the same quarter last year, analysts said last week.

Several companies—BellSouth, Pacific Telesis, Southern New England Telecommunications (SNET) and Telecom*USA—reported a drop in net income while most of the other companies posted modest gains.

"Long distance continues to go strong. But if the local exchange is a growth business, it hasn't shown it yet," said Harry Rosenthal, an analyst with Deutsche Bank Capital Group.

Pacific Telesis blamed a 17% drop in net income on higher expenses and a $391-million rate cut that was part of an incentive regulation plan in California. BellSouth attributed its decline to the costs of an early retirement program and the acquisition of Mobile Communications Corp. of America. SNET said a poor Connecticut economy was the main cause of a 6% drop in net income.

On the long-distance front, the big three carriers posted healthy gains. AT&T reported a 12% increase in net income on a 2.7% rise in sales, which some analysts called the company's best quarter since divestiture in 1984. MCI Communications Corp. said first-quarter revenues increased 20% and earnings per share jumped 22% from a year ago.

United Telecommunications, the parent of US Sprint, reported a 15% increase in revenues and a 42% jump in earnings per share. Those figures were helped by Sprint, which posted a 24% increase in net operating revenues to $1.2 billion and increased its operating margins from 3% to 7%.

Telecom*USA, which is being acquired by MCI, reported a drop in net income on a 30% increase in revenues. The company blamed the drop in profits on a jump in the tax rate from 36% to 41%.

Many local exchange carriers credited strong cellular growth for much of their increased earnings. Southwestern Bell, for example, said cellular customers increased by 15.4% while access lines grew by only 1% in the quarter. U S West NewVector Group Inc. reported a 54% jump in revenues. Nynex said cellular customers grew by 62%. Pacific Telesis said cellular profits jumped 74%.

"There were very few surprises in the quarterly reports. Overall, they were a little better than the fourth quarter. The big question for the local exchange carriers is the incentive regulation plans," said Audrey Stevoff, vice president at Duff & Phelps Inc.

"These plans sound terrific. But there is considerable risk in some of these plans. They are usually accompanied by a sizeable rate cut or rate freeze. That means they have to be in place for a while to produce results," she said.

Rosenthal also pointed to incentive regulation plans adopted by many states as the key to better financial reports from local exchange carriers.

"When will all this talk about regulatory changes and new businesses and new services hit the bottom line? I don't think it will be in the next quarter or two. It takes time for new technology and rate relief to translate into better earnings," Rosenthal said.

"LECs are no longer ugly ducklings, but they haven't matured yet into beautiful women. They are at this awkward teenage stage with some traces of acne. They are no longer just regulated utilities. But they haven't matured yet into growth companies," he said. **T**

FINANCIAL SCOREBOARD
FIRST QUARTER EARNINGS REPORT

	Net income (millions)		Revenues (billions)		Earnings per share	
	1990	1989	1990	1989	1990	1989
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Alltel	42.2	38.9	0.32	0.27	0.63	0.60
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bell Atlantic	355	330	3.02	2.77	0.90	0.84
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Centel	14.1	4.7	0.31	0.28	0.16	0.05
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MCI	163	135	1.80	1.50	0.62	0.51
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Pacific Telesis	262	317	2.37	2.34	0.65	0.78
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Southwestern Bell	247	238	2.12	2.05	0.82	0.79
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
United Telecom	107	76	2.02	1.76	0.51	0.36
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

U S West to test calling name ID

Carol Wilson
Editor

U S West will conduct the initial test of Northern Telecom Inc.'s calling name identification in May as the second phase of a customer local area signaling services (CLASS) technology trial, the company announced recently.

The calling name delivery capability, announced by Northern in March, is an enhancement to the more standard call-

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Telephony

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OBILE COMMUNICATIONS
S HOT IN EUROPE But who
ill supply the phones and what
ystem will come out on top?

MFJ BILL FORGES AHEAD IN SENATE

Historic milestone reached as committee passes legislation

BUSINESS USERS LASH OUT AT TELCOS

ICA criticizes BOCs for failing to meet users' needs

MONDAY, MAY 28, 1990 Volume 218, No. 22

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INTEGRATING VOICE & DATA COMMUNICATIONS

The standards cross-country trek for mobile communications in Europe is heating up. Even if PCN wins the U.K. time trial, will it be the overall winner on the continent? Cover art by Michael Jones

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China follows the long road to telecom growth

After decades of neglect, the Chinese are aggressively upgrading their telephone network

LIN SUN

Between the 1950s and early 1980s, China gave its development priority to heavy industry and agriculture. For a long time, a telephone was considered a luxurious commodity and given little attention. Postal and telecommunications systems were largely outdated and inefficient, and their profit level was incredibly low.

In the early 1980s, however, China began to view telecommunications as an integral part of its strategic development. According to the Ministry of Posts and Telecommunications (MPT), by the end of 1980, China had only 4.2 million telephone sets for a population of about 900 million. That works out to only 0.4 phones for every 100 people nationwide, or 0.4%. This was far below the world average of 11% for the same period.

By 1987, China's phone penetration level had grown to 0.75%. However, this was still far below the world average, and even below other developing countries. During the same time, for example, the telephone density in South Korea was 9.1%, Mexico was 7.6% and Brazil was 6.3%.

Beijing, China's capital city with a population of 10 million, enjoys the highest telephone density in the country, mainly because it is the center of colossal government agencies and a handful of economic activities. But its telephone density is only 4.7%, one of the lowest telephone densities among the world's capital cities.

Now after eight years of development, the telephone industry in China finally is beginning to take shape. Telephone penetration is growing at the phenomenal pace of 20% annually. The race for advanced switching and transmission technology is accelerating.

To maintain a high speed of development, however, China must address key issues. These include production of push-button telephone sets, digital switching equipment and advanced transmission media.

China has obtained technology to manufacture telephones with standard features. Although the production figure is not known, Chinese-made push-button phones have appeared in the market, with advanced features such as built-in memory, automatic redial, call waiting and third-party conversation. At present, production capacity lags behind market demand. A policy should be made in the direction of replacing rotary dial with push-button phones in accordance with digital switch implementation.

The current annual switch production output is about 200,000 lines, about 3000 of which are long-distance switches and about one-third of which are manual switches. The manufacturing capability is being dwarfed by demand for new lines and high call volumes. China didn't use stored program control (SPC) switching until 1984, but the SPC capacity increased to 25% of total switching lines by 1988, thanks to technology transfer and large-scale imports. For the next few years, China will have to continue importing advanced PBXs from overseas to transform and update its telecommunications networks.

Copper cable is currently the primary transmission medium for China's more than 300,000 kilometers of long-distance networks, with microwave systems accounting for less than 4%. However, the low capacity of copper lines and poor transmission quality are directly responsible for overloaded traffic and low call completion rates (approximately 20% to 30% in cities). High-capacity media such as coaxial cable and fiber optics are critical for digital technology development and data transmission.

Administrative Structure

In general, China's telecommunications structure reflects pyramidic political and economic structures. China's telecom administration consists of four levels.

The MPT sits on top of the entire hierarchy and is solely responsible for all international and domestic long-distance communications, such as tariff policy, services, technology transfer and research and development. The MPT also assumes administrative power over all telecom manufacturers, carriers and other postal services.

In reality, this responsibility does not come with strong financial ties or market considerations at the local level. A local telecom authority controls its budgeting and production plans in its own territory, although it has to conform with MPT policies and seek MPT approval before it acts.

This dual administrative structure can hurt local development. For example, little R&D is done on the local level, although centralized research may not be applicable locally. Moreover, because of the centralized decision-making process, reaching a workable decision is a time-consuming process. That means that local phone companies cannot be as responsive to local market needs.

Financing

In the past, China's telecommunications revenues did not come from products or services provided to the market, but were totally dependent on government subsidies. Budget deficits have seriously constrained development. The annual budget for telecommunications had been only about 0.8% to 1% of the total, compared

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to 5% in most countries. A return on telecommunications investments was not even expected, making it one of the slowest industries to develop.

Since the 1980s, the situation has changed dramatically. Relaxed financing policies in the economic arena forced the telecom industry to resolve its funding shortages. Another factor in this change is the huge amounts of capital required for technology transfer and other R&D projects. Government subsidies can no longer maintain a steady development pace.

TABLE 1 TELECOMMUNICATIONS FINANCING SOURCES (1986-1990)

Sources	Proportion (%)
Central government	31.05*
Local government	4.52
Domestic loans	3.69
Foreign capital	0.29
Self-raised investment:	
By localities	3.01
By enterprises	51.13
Other sources	4.31

Source: *Development of Telecommunications in China*, MPT, 8/88

* China usually combines the budget for telecommunications industry with transportation. The 1987 budget was about $3 billion. The telecommunications budget was unlikely to exceed half of the total, so the estimated telecom budget is around $1.5 billion.

A policy for multiple financing was formalized in 1986 (Table 1). Although government financing still accounts for a large portion (more than one-third) of the budget, the portion is expected to decrease in the 1990s as local financing grows. Though the advantages of a mobilized financing policy may not be realized in the near term, the direction is toward a marketplace of telecom products and services that for the most part do not exist today.

In general, a higher investment suggests a better return. But in China, a good financing policy has to encompass, or often compromise with, factors such as bureaucracy, management and training. Investment return is another hidden impairment. At present, the turnover from telecom services accounts for only 0.15% of the gross national product (GNP) compared to 2% to 3% in other countries.

Questions also have arisen concerning the use of funds. A contradiction exists between centralized planning and local financing incentives. A local telecom authority may have the money to buy equipment, but must have the purchase approved by the MPT. This discrepancy may cause gradual deviation from central management, which may delay progress. Or it may prompt the government to continue to yield more decision-making power to the local level. Although it is unlikely that the current financing options will change the administrative structure completely, the trend will be toward a gradual mobilization within a centralized system.

In any event, telecom financing is a crucial bottleneck for development. Although the lack of funding is always imminent, a good distribution of funds will result in a better return on investment. From this standpoint, centralized expenditures are the least preferred policy option because they often overlook specific needs and waste is almost unavoidable.

Prospects of Foreign Investment

Despite little direct investment from the international community, China has been purchasing state-of-the-art telecom equipment in large volumes from foreign vendors.

In the first half of 1988, China signed contracts with overseas suppliers to import 2.7 million SPC intracity telephone sets and 95,000 SPC long-distance sets during the next decade, according to a report in China Market. Thus far, more than 1.54 million intracity phones and 40,000 long-distance phones have been installed.

Japan has been China's leading equipment supplier and trade partner with 35% of total sales. In the past two years, China has steadily increased its orders from European vendors from about 10% to 20%. North American vendors seem to have made little progress in increasing sales to the Chinese market, remaining at 20%. Surprisingly enough, U.S. vendors have played a moderate role. Although AT&T has sold some 5ESS ISDN-ready switches, it has a cautious marketing policy in China. In contrast, Northern Telecom of Canada has been active in China.

Japan is vying rigorously for the Chinese market with its European rivals. During a visit to China last August, Japanese political leaders promised an Y810 billion ($5.29 billion) government loan package. China will use part of the loan to buy 620,000-line SPC PBXs for its nine provinces. So far, Sweden's LM Ericsson, Alcatel of France and other vendors have successfully sold at least $100 million in telecom equipment products to China.

The large-scale technology transfer soon may show serious problems, such as protocol compatibility between different systems. With that problem still somewhat distant, however, China is most concerned about how to harness technology transfer to its strategic goals.

The first step is to establish a national communications infrastructure. A four-tier network is being proposed with the following nodes: interprovincial, provincial, intercity and county. Each tier has several subnodes, or centers. Metropolitan areas are most likely to be the centers of the proposed network.

The second step is for China to emphasize its acquisition of research and manufacturing capabilities to eventually take the lead in its market and exportation. To serve this purpose, foreign vendors often are asked to engage in

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joint-venture marriages. For example, Ericsson has a joint venture in Beijing to manufacture a 300,000-line ISDN AXE SPC exchange in China. Northern Telecom's joint venture is investing $13 million to produce integrated services digital network systems and digital phone sets.

Joint ventures are seen as a convenient approach for China to acquire advanced technology and satisfy its domestic market at the same time. They also may present a potential market for foreign vendors. Joint ventures also have posed serious problems. These include conflicting management styles, product quality and, above all, China's eagerness to acquire new technology and foreign vendors' hesitation about investment return and effectiveness of current policy.

Other Major Developments

China's telecommunications industry has made other strides to reinforce its telephone networks by building a solid infrastructure. New economic policies and regulatory measures soon may be put forth in the Chinese legislature.

China also has installed more than 25 short to medium-sized (500 kilometers or shorter) fiber optic transmission links across major cities. They are used primarily for intercity telephone communications, television transmission and data networks. The first long-distance fiber trunk (2200 kilometers) is under construction in central China and will be completed this year. Optical fiber, terminal control equipment and other key systems are being imported from the United States, Italy and West Germany.

The trunk will provide six data communications channels, each with a capacity of 1920 lines. Along with other local trunks, the fiber network will greatly improve communications quality and eventually reduce long-distance rates.

China is already using a cellular system in Beijing, and a number of others are under way. The Motorola TACS system in use in Beijing operates at 900 MHz and was chosen for its 360 channels in A-band, with B-band for future expansion. It covers the central Beijing area with hotels, business districts, airport and tourist attractions. The project cost about $10 million. Cellular phone users are expected to reach 30,000 by 1990, primarily concentrated in coastal cities and industrial centers.

China began importing fax machines in the early 1980s. According to MPT statistics, fax users exceeded 10,000 in 1988. In Beijing, international fax transmissions account for 13% of total remote communications. Public fax services and networks are also available from post offices in major cities. Annual market growth is estimated to be 4% for the next few years. Limited phone lines will greatly constrain the fax market. Fax users will amount to 25,000 by 1990.

China has an aggressive five-year plan for telecommunications growth. Though obstacles remain, there is much hope that a turnaround is in sight. ■

Lin Sun is a Ph.D. candidate at Michigan State University, Department of Telecommunications, East Lansing.

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European mobile communications is hot, hot, hot

JOHN WILLIAMSON, International Editor

Mobile communications is hot in Europe right now, causing heated debates and intense rivalries among the wanna-bes. Who wouldn't want to get in on the action when many observers predict that by the end of this decade 50% of all telephones bought in Europe will be mobile? What is still up for grabs is who will supply these phones and what type will be most successful in the marketplace.

Although analog cellular telephony and private mobile radio will continue to satisfy European users' communications needs, the big mobile explosion is expected to come from four new technologies—telepoint, digital European cordless telephone (DECT), the digital cellular system know as Groupe Speciale Mobile (GSM) and personal communication networks (PCNs). All of these systems will compete with each other, although initially the duels will be telepoint vs. DECT and GSM vs. PCN.

Telepoint's Changing Fortunes

Telepoint is a limited distance, one-way cordless pay phone service based on the CT2 cordless telephone standard. Users must be within approximately 100 meters of a public access point, and handover from one coverage zone to another is impossible. It recently debuted in the United Kingdom, but already has had a somewhat checkered career.

In 1989, four consortia—BYPS Communications, Ferranti Creditphone, Phonepoint and Mercury Callpoint—won licenses to provide proprietary telepoint services, but all are required to move to a common air interface (CAI) system later this year.

The proprietary systems have not been runaway successes,

The cross-border use of GSM was originally touted as one of its unique selling points. Today, the consensus is that this will be of less consequence than the additional capacity it will provide.

and one senior industry executive admits to having "fumbled the ball."

And it gets worse. At the end of 1989 the U.K.'s Department of Trade and Industry (DoTI) licensed three consortia—Mercury Personal Communications, Unitel and Microtel—to provide two-way PCN services beginning in 1992. Mercury now includes Motorola and Telefonica; Unitel is made up of STC, Thorn EMI, U S West and Deutsche Bundespost Telekom; and Microtel presently comprises British Aerospace, Matra, Millicom and Pacific Telesis.

Although the DoTI tried to downplay any adverse effect PCN might have on telepoint, earlier estimates of up to 6 million CT2 telepoint users by 1995 look unrealistic.

Attempts to sell telepoint abroad—to achieve economies of scale—were originally rebuffed by the European Commission. The EC, along with a group of manufacturers led by Ericsson and Phillips, was concentrating on DECT standardization. Although DECT is designed for cordless PBX applications, public network derivatives are being developed.

DECT, like PCN, is two-way. In September 1989, a group of European manufacturers signed a memorandum of understanding committing to develop products that would enable DECT implementation next year.

Three months before the DECT memorandum, the European Telecommunications Standards Institute (ETSI) held a special forum to review and prioritize the region's proliferating mobile research and service initiatives. In its March report, the review's executive summary did not mention telepoint, which led to speculation that CT2 had suffered a death blow.

The full ETSI report did in fact support trials of both CT2 and DECT to gauge market reaction in different countries. Manufacturers such as GPT argue that another recommendation of the review—

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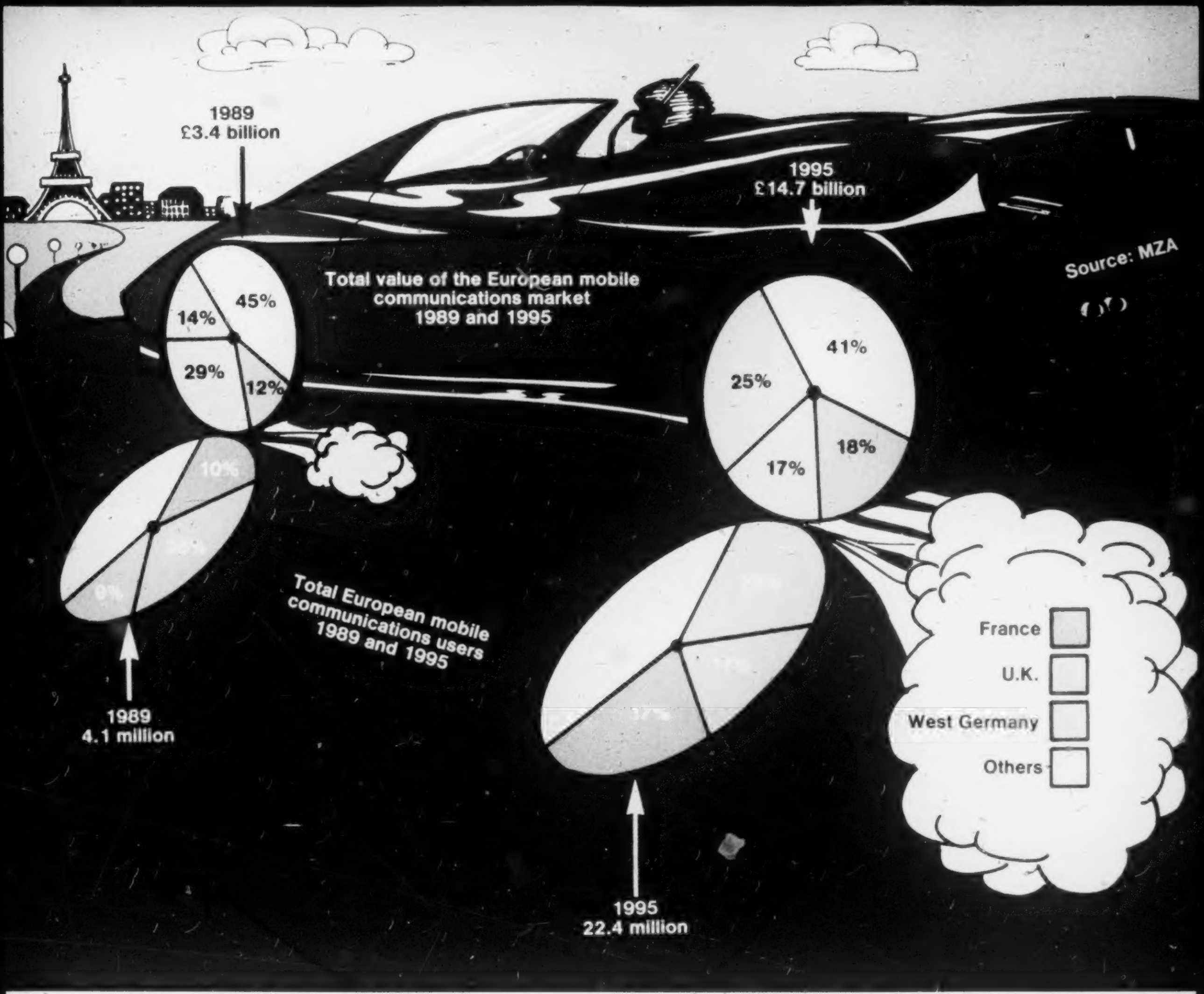

Hot, Hot, Hot *continued*

to base PCN on the GSM standard—would neither extend nor narrow the commercial window for CT2 since initial PCN terminal prices would be high out of necessity, and mass markets are price sensitive.

"Nobody has come up with any wonder technology," says Tim Lowry, director of GPT Mobile Systems. "PCN is not going to be cheaper than GSM in the first five or six years."

The U.K. CT2 camp feels that the technology will turn a profit, although everyone agrees that DECT is the regional cordless device of the future.

"We see a good international market for at least five years before DECT and PCN technologies become as competitive as CT2," says Richard Mendelsohn, marketing director of Orbitel Mobile Communications Ltd.

A new report commissioned by BYPS Communications from the U.K.'s Henley Centre for Forecasting predicts that the telepoint industry will have an annual turnover of more than £1 billion ($1.6 billion) by 1995, with 3.5 million users annually spending £300 ($480) each for the service.

Abroad there has been something of a revival of CT2 telepoint. CT2 is being tested—or will be—in France, West Germany, Spain, Portugal, Finland and Italy. These countries, with the exception of Italy, signed memorandums of understanding with the U.K. and Belgium to adopt CAI CT2 telepoint in mid-March. Shortly thereafter, the ETSI formally adopted CAI CT2 as an interim European standard.

On the other side of the globe, New Zealand has decided to begin a telepoint trial, and Australia and Taiwan also are interested in telepoint. And Ferranti has had discussions with some of the Bell regional holding companies in the United States.

The DECT community does not share this benign view of CT2, fearing that the early introduction of CT2 will distort the overall cordless market.

The DECT position, as enunciated by Ericsson, is that time division multiple access DECT, operating in micro-cells of between 30 meters and 50 meters, is more suitable than frequency division multiple access CT2 for high-density PBX and business applications that generate the vast bulk of telephone traffic.

"We believe that the DECT standard will best combine the qualities that will be needed for the

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workplace," says Ericsson Chairman Bjorn Svedberg. "So we will put our money on DECT for the workplace."

The DECT standard is based on a proposal made by Televerket, the Swedish PTT, and Ericsson in 1985 that was endorsed by the Conference of European Post and Telecommunications (CEPT) administrations in 1988. In Sweden, DECT frequencies have already been allocated and PBX applications will be tested this year.

The Dutch PTT also has decided to evaluate Ericsson pre-DECT systems in both PBX and telepoint applications. Dubbed CT3 by Ericsson, the pre-DECT technology will be tested in the U.S., Canada and Australia. In April Ericsson licensed CT3 manufacturing and distribution rights to Canada's NovAtel. It is the first in a number of new CT3 international partnerships, Ericsson says.

While DECT-like systems are beginning to target the public domain, CT2 is being developed for PBX applications. Championing this initiative is the U.K.'s GPT, which is believed to have 50-port and 100-port models near completion. There are also plans, more fully articulated in France than elsewhere, to overcome CT2's one-way calling limitation by manually registering a subscriber's presence in a given coverage zone.

The two cordless technologies are converging on the same business market sector from different starting points, with CT2 moving off the street into the office and DECT out of the office and into the street. Although CT2 will not achieve universal two-way calling without substantial advances in intelligent network technology, its more restricted repertoire will be offset by lower prices.

"It's a rat race in this sector," says Svedberg.

Interestingly, companies on both sides of the cordless divide are hedging their bets. GPT, for example, has a £1 million DECT development budget. Svedberg has indicated that, in time, Ericsson will probably supply non-DECT cordless equipment.

PCN Rising

As CT2 and DECT limber up to meet each other in the marketplace, PCN advocates are developing strategies to lure customers away from cellular services. An added dimension to the battle is that European subscribers will be able to choose either analog or digital systems for several years. And operators of the GSM system are not always the same as the existing analog cellular operators.

The PCN/cellular drama first will be played out in the U.K., where the two analog cellular operators, Cellnet and Vodafone, already have more than 1 million subscribers and are presently gearing up for GSM. Pitted against them are the three PCN operators looking for a late 1992 service launch and a total subscriber base of around 10 million by the end of the decade.

This month the three nominated PCN operators were still negotiating the terms and conditions of their licenses with the DoTI even though the general outline of their intentions is already known.

Initially the U.K. PCN license applicants were invited to submit proposals derived either from the 900-MHz GSM standard or DECT. And separate proposals for each could be made. Then the DoTI would nominate the operators and announce a common standard. But the DoTI simply announced the three licensees, leaving them to negotiate standards with the ETSI.

Observers believe that throwing the PCN standards ball into the ETSI's court was designed to avoid a repetition of the earlier CT2 run-in between the U.K. and the EC. "It was prudent to let them have a view on it," says Motorola Europe Corporate Vice President Don Burns.

As a result, the basic technology platform for PCN is a higher frequency version of GSM, now dubbed the Digital Cellular System at 1800 MHz (DSC 1800) by the ETSI review.

Instead of being oriented toward relatively high-powered vehicular terminals like current generation cellular systems, U.K. operators intend for PCN to use very low power pocket phones. This reduction in terminal size and power is possible because of the use of micro radio cells that are between 0.4 kilometers and 6 kilometers in radius in urban areas. Analog cellular uses cells that average 15 kilometers or more.

Using very small cells, specific service coverage areas can be tailored to meet individual needs compared to analog cellular, which has a blanket coverage and tariffing structure. Smart card technology will provide some of the intelligence to operate PCN systems, although Mercury Personal Communications is already committed to spending $16 million on information technology systems.

The first PCN pocket phone—weighing slightly more than a microcassette tape recorder—uses smart card technology and includes an internal antenna. It will be unveiled by Mercury Personal Communications in mid-June and will probably be manufactured in bulk by Motorola, a partner along with Cable & Wireless and Telefonica in the Mercury consortium.

Peter Carpenter, Mercury Personal Communications' director of finance and business strategy, predicts that PCN terminal unit prices will start at $800 and drop to around $320 by 1995.

"Terminal costs are a matter of volume," Carpenter says. "As with other consumer electronics, every time you double the volume, the price goes down 20% or 30%."

Mercury's service will initially target urban subscribers. "We're interested in covering the people, not the sheep," says Carpenter. "Wide-open cellular,

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the national service, covers a lot of sheep in the process."

PCNs also will initially build volume on the type of business subscriber now using cellular telephony. It would be erroneous, however, to conclude that PCN operators will undercut cellular subscription or terminal prices. Carpenter cites market research that indicates business users are prepared to pay at least current cellular prices for the smaller terminal size and added functionality of PCN.

As far as call charges are concerned, Mercury's local area rates will be slightly more than telepoint rates, but about 50% less than cellular service.

As might be anticipated, U.K. cellular operators are not resting on their laurels as PCN approaches.

> *The DECT community does not share this benign view of CT2, fearing that the early introduction of CT2 will distort the overall cordless market.*

Both Cellnet and Vodafone are mulling schemes to include low-cost, urban micro cellular options in their service repertoires. Gerry Whent, chief executive officer (CEO) of Racal Telecom, Vodafone's biggest shareholder, is reported to be considering an investment of $160 million to launch a service using 1-kilometer cells. Cellnet already operates a cell with a 0.5-kilometer radius.

The cellular operators also are cleaning up their existing analog cellular offerings, which have been heavily criticized lately for low quality and high congestion. Vodafone is believed to be spending $224 million annually to expand its infrastructure, while Cellnet Managing Director Stafford Taylor relaunched service May 15 with an annual investment program of more than $320 million.

Cellnet wants to expand its voice channels in use from 11,500 in October 1989 to 30,000 by next March to help reduce its average ratio of customers to voice channels from the 35 recorded in November 1989 to 21 by March 1991.

Don't Forget GSM

Approximately 17 PTTs have committed to GSM, with countries such as the U.K. beginning service in mid-1991. According to EC estimates, there could be 16 million GSM subscribers by the end of the decade, although there are conflicting opinions about the rate of service uptake.

Roland Mahler, who oversees mobile developments at Deutsche Bundespost Telekom, believes that a second-generation GSM will "certainly be needed before 1995." By contrast, a recent report from U.K.-based CIT Research opines that GSM is "unlikely to achieve the success suggested by its proponents much before 1995."

The cross-border use of GSM was originally touted as one of its unique selling points. Today, the consensus is that this will be of less consequence than the additional capacity it will provide.

"Our position on the perceived demand for Pan-European roaming remains consistent with past convictions," says CIT Research. "We have encountered little to suggest that there will be much demand for an international roaming facility. Even if demand exists, the feature will not be available in all parts of Europe until full infrastructure coverage is achieved."

Although Orbitel unveiled a production-sized GSM handset in late April, progress toward comprehensive GSM standardization has not been easy. The ETSI, which has taken control of the process, has acknowledged slippage in the original schedules.

There also are residual problems with intellectual property rights. Some ETSI members have criticized Motorola and Philips for not allowing free access to their key GSM technology patents. As a result, there is a new initiative within ETSI to force companies to surrender patents or be expelled from the ETSI.

Continuing difficulties with GSM standardization could, of course, adversely affect PCN and delay the stabilization of the DCS 1800 specification by December.

Extended delays would undoubtedly hurt the U.K.'s PCN operators. Notwithstanding the participation of Telefonica and Deutsche Bundespost Telekom in two of the U.K. PCN consortia, and talk of a forthcoming regional memorandum of understanding on PCN, there have been few concrete proposals for the service in mainland Europe as yet.

Telefonica is interested in using PCN as a quick fix to Spain's chronic shortage of wireline connections. And late last year PTT Minister Dr. Christian Schwarz-Schilling said it was highly probable that one or two PCN licenses would be issued in West Germany if the appropriate frequencies could be found.

There definitely is widespread interest in PCN and its possible contribution to the development of the overall mobile sector.

"You'd better keep up with the technology or you're going to end up in the rocking chair," argues Microtel CEO James E. Blake.

The U.K.-based MZA Consultancy predicts that in 1995 there will be 22.4 million European mobile communications users and the market will be worth $23.6 billion. Beyond 1995, there is general consensus that total users and revenues generated in mobile communications will rival telephone statistics.

Some observers believe future overall regional demand will accommodate many different suppliers and products. As Arthur D. Little Senior Consultant Malcolm H. Rose points out, mobile operators and equipment suppliers are actually struggling to keep up with demand.

Other observers believe that demand will remain buoyant, but user numbers will not increase at present rates indefinitely. These observers think that particular features of some mobile technologies will make them more marketable than others. Certainly the public pronouncements of the CT2 telepoint, DECT, GSM and PCN lobbies indicate that fierce competition is inevitable. ■

Telephony

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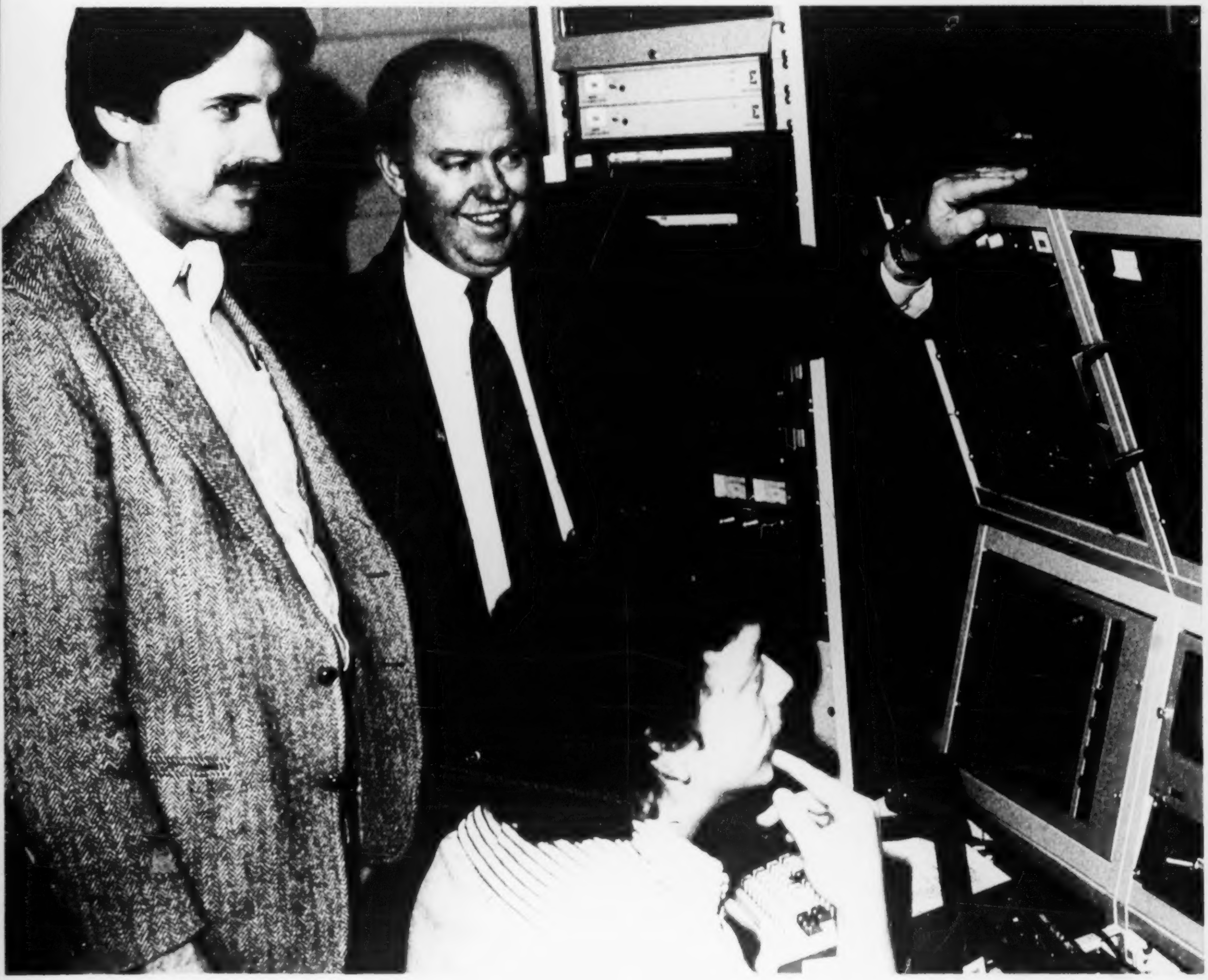

VIDEO DS3 FIBER GETS SMART

New England Tel helps the University of Maine bring education to the people

1-900-GROWS-UP

Calling service matures into legitimate business tool

AT&T ACQUIRES WU's EASYLINK

AT&T spends $180M for electronic messaging units

MONDAY, JULY 9, 1990 Volume 218, No. 2

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS

The University of Maine linked forces with New England Telephone to provide education statewide. Pictured here in the master control room for the interactive television system are (l to r) George Connick, president of the University of Maine at Augusta; Fred Hurst, director of interactive television; and Bob Reichenbach, TV master control switcher. Cover photo by Kathy Moore

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NEWS OF THE WEEK

1-900-GROWS-UP

Maturing industry hits new markets

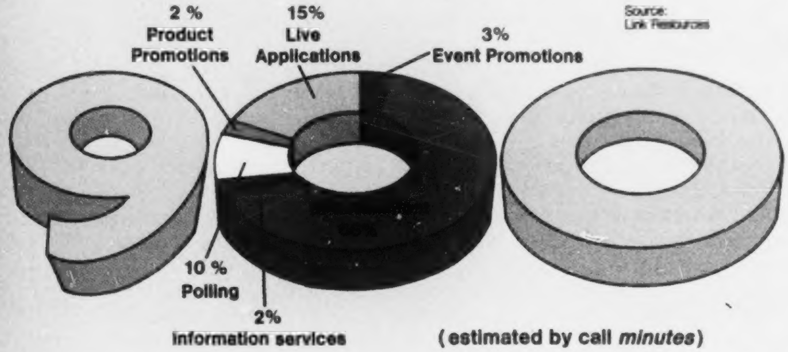
Richard Karpinski, Assistant Editor

This may be the year the 900 industry begins to outgrow dial-a-porn, gab lines and celebrity update services and becomes a legitimate marketing, advertising and customer service tool for the corporate world.

By most accounts, the maturation of the industry will not happen by itself. Unlike the initial boom of the 900 market, which saw carriers sit back and watch the programs—and the profits—roll in, this next phase will require the carriers to move beyond acting as a mere pipeline.

And four long-distance carriers—AT&T, MCI Communications Corp., US Sprint and Telesphere Communications Inc.—have been responding quickly to improve and expand service to ride this latest 900 trend.

NATIONAL 900 MARKET BY APPLICATION TYPE



(estimated by call *minutes*)

Source: Link Resources

"We're going into the second generation of 900 services," said Pat Mindrup, director of marketing for Sprint Gateways, US Sprint's 900 services unit. "Corporations need to keep an open mind, because many, many success stories are being made right now. It's where a significant part of the 900 industry will be going in the future."

"We've seen more and more big name companies jumping on the 900 bandwagon," said Kevin Raftery, product marketing manager for AT&T MultiQuest. Although 900 has been primarily an entertainment medium thus far, business applications have experienced "geometric-type growth" in the last year and may eventually catch up with entertainment programs in terms of revenue, Raftery said.

Although it is still young, the 900 industry is already a big moneymaker, and according to experts it is ready to start booming again. The national 900 market was estimated by Link Resources at $235 million in 1989 and is projected to grow to $1.2 billion by 1994. And that may be a conservative outlook; other analysts have projected growth of up to $2 billion by 1992. The carrier take on that market is about 25%, according to most estimates.

Yet the market remains largely an entertainment medium. According to a Link Resources industry study, at present only about 4% of all 900 call minutes are devoted to corporate uses.

So why all the fuss about courting corporate users? The key, carriers say, is new business. Although some experts predict that increases in 900 business applications will drain revenues from existing 800 services and entertainment programs, most carriers say this isn't true.

"What we've seen is not a movement away from entertainment, but rather a greater percentage of programs have become business-to-consumer oriented. We feel this is the area that's really going to be taking off in the future," AT&T's Raftery said. "The growth in 900 will be new business."

Corporate use of 900 numbers is a big market that needs to be tapped, said Jim Hertel, vice president of marketing for Telesphere 900. "We're trying to make our business grow. With hard work, we will see an opportunity for our usage minutes to grow, and business applications can help it grow in a positive way."

Beyond the obvious profit motive, there is much to attract corporate users to 900 services. Specifically, all four of the major 900 carriers have added innovations to their 900 lines that appeal directly to more sophisticated business clients.

AT&T, which invented 900 services more than a decade ago with Dial It 900, a barge-in broadcast service that let callers listen in on live events or hear prerecorded messages, has just begun to pitch 900 service as a business tool.

Last year, the carrier introduced the fully interactive MultiQuest 900 service. Its InfoWorx feature lets service providers set up service bureaus within the central office. This way, providers can work directly with AT&T to develop programs.

Finally, the company has set down stringent guidelines to lure back customers put off by the 900 industry's reputation as a purveyor of pornography and for price-gouging on calling services marketed at children.

"[The guidelines] have really helped us clean up the image of 900," said AT&T's Raftery. "The only way business-type applications will take off is if everybody places tighter controls over what types of programs they will and will not provide."

AT&T's efforts have begun to pan out, and the company has attracted corporate customers such as Charles A. Schwab and Amtrak, both of which use InfoWorx to take customer phone orders, as well as Lotus and Pratt & Whitney, which use their 900 numbers as customer service hot lines. So far, reports from these users have been positive.

"While no one likes to pay for something they have been getting for free,

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AT&T acquires WU's EasyLink

Richard Karpinski
Assistant Editor

In a move that expands its already substantial electronic messaging offerings, AT&T acquired Western Union's EasyLink electronic mail, telex and packeter," US Sprint said in comments submitted to the FCC Tuesday. But Sprint said that AT&T's market share is "more than double the industry-wide level considered by the Department of Justice to indicate a 'highly concentrated' market."

AT&T currently is classified by the FCC as a "dominant carrier." As such, it is the only long-distance company on which the agency imposes various regulations, including the requirement for filing tariffs. AT&T repeatedly has argued that it is playing in a competitive market and that the FCC rules place it at a serious disadvantage. In the inquiry launched earlier this year, the FCC reached a "tentative" conclusion that some of the regulations should be lifted where AT&T appears to face competition, primarily in the large business market.

But while other long-distance companies criticized the finding, AT&T said that the agency stopped short.

"While business customers are clearly penalized by today's unequal regulation, we think it's an error to focus on that market alone," said Bill Cartucci, AT&T's vice president for regulatory affairs. Cartucci said that AT&T wants other "unneeded regulation" lifted, as well.

AT&T's competitors and others, however, told the FCC that any radical change in regulation will only seriously damage competition, not foster it.

Noting that there are many divergent views on the issue among AT&T's competitors and consumers, there is, nonetheless, "no disagreement on the fundamental question of deregulation," said James M. Smith, president of the Competitive Telecommunications Association. Smith told a Washington press conference Tuesday that with a 70% market share and "enormous profits," AT&T is more than five times bigger than its largest competitor, MCI, even after that company's recent acquisition of Telecom*USA.

CompTel's filing with the FCC called for the agency to take several steps before it proceeds with further deregulation. Specifically, CompTel wants the agency to eliminate "substantial remaining barriers to true competition, especially in the areas of local access cost structures and network interconnections" that it says unduly benefit AT&T.

The Consumer Federation of America said that the FCC should be trying to make price caps work before proceeding further. Gene Kimmelman said that AT&T's cut back on its evening/night discount calling periods last December is but one example of how caps are failing consumers. He also cited the company's "failure" to pass through "all" of the savings from the local exchange carriers' access rate reductions that went into effect this month as another example that caps are not benefiting consumers.

In addition to the opposition expressed last week, there also is support among some lawmakers for hearings on the FCC's apparent move to further deregulate AT&T, just one year after price caps were put into place. Rep. Tom Tauke, R-Iowa, for example, has called for hearings. ■

'Nobody does it better,' boasts cellular industry

Michael Warr
Technical Editor

There is nothing personal communications networks can do that cellular can't do better, John Stanton, vice chairman of McCaw Cellular Communications Inc., told PCN proponents at the first Worldwide Personal Communications Com-Forum held June 27-28 in Dallas.

Cellular's chief advantage is that it has proven itself, Stanton said. PCN is an experimental technology that cannot yet handle vehicle handoffs.

"PCN and CT2 are nothing more than variations on a theme," he said.

McCaw, now strongly established in cellular, will be "defending its turf," against new technologies, Stanton stated. He predicted that by 1997 cellular service will have blanketed the United States while PCNs will have only been built in scattered locations.

Those interested in the mobile market should abandon the PCN concept and focus on market niches such as rural fixed service, rural mobile service and wireless, in-building PBXs, he said.

Stanton backed up his claims with Europe's cellular experience. The Scandinavian countries, for instance, have reached a 5% annual rate of penetration, and he expects a comparable growth curve in the United States.

This projection was supported by a U.S. cellular market report by Bell Atlantic Mobile Systems Inc.

The number of U.S. cellular systems on-line grew from 87 to 588 between 1985 and 1989, according to Bell Atlantic. After 1987, demographics began to change. For example, in the past three years the number of cellular users who make less than $30,000 a year has been growing faster than the number of users who make more than $75,000.

"Lower-priced portable and transportable phones are . . . attracting the consumer market," said A. Robert Handell, vice president-marketing and sales for Bell Atlantic Mobile. "They offer instant cellular gratification."

McCaw's Stanton also warned would-be PCN providers that they face some heavy-hitters in the regulatory arena. Right now, he said, PCN spectrum is in the hands of petroleum companies, railroads, telcos, interexchange carriers,

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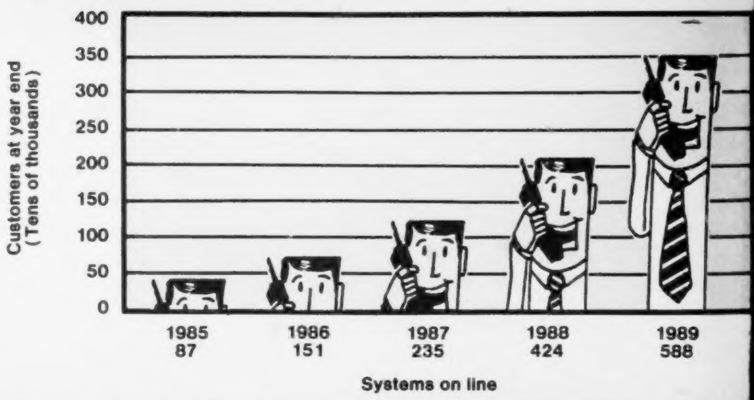
CELLULAR INDUSTRY
Customer growth: 1985-1989



CATV operators and broadcasters, all of which have no need for PCN, according to Stanton.

Though Stanton led the cellular offensive at the forum, others were less optimistic about U.S. PCN deployment.

Martin Cooper, chairman and chief executive of Dyna Inc., considers PCN an inevitable technology of the future, but he is convinced that it will take a lot longer than seven years for PCN to carve a significant share of the U.S. market, and even longer to supplant cellular.

"In 20 years cellular will dominate telecommunications. McCaw doesn't have to worry about PCN and CT2 undermining its market," Cooper said. "Instead, the cellular industry should promote CT2 since it will raise awareness of cellular."

John Carrington, managing director of Mercury Personal Communications and one of PCN's strongest supporters, was a scheduled speaker but missed the conference because of illness. Carrington predicted in a paper published at the forum that by the year 2000 there will be 13 million pocket telephones in use in the United Kingdom—making them as common as credit cards.

KDD reorganizes as income lags

Michael Galbraith, Special Correspondent

Kokusai Denshin Denwa Co. Ltd. has restructured its organization to improve service and efficiency as well as to defend its market share from Japan's two new international carriers.

The changes come only weeks after KDD announced a sharp drop in income for the fiscal year ending March 31, 1990, and an even more gloomy forecast for 1991. In fiscal 1990, net income was down 24.7% to Y29 billion ($190.5 million) on revenues that grew only 0.1% to Y259 billion. Further, for the present fiscal year, KDD expects revenues to fall 10% and net income to drop 50%.

According to industry sources, KDD's financial woes can be traced to International Telecom Japan Inc. and International Digital Communication Inc., two recent entrants to Japan's international carrier market that have siphoned off about 35% of the business on the key U.S. route, nearly 30% on the U.K. and Hong Kong routes, and about 23% of the total market on all the routes.

In KDD's reorganization, sales and marketing operations will be strengthened with the addition of 50 staffers, and two new sales operations will be created in the Tokyo area.

KDD President Takazo Ishii told a press conference that "restructuring is necessary to fortify the company to fight the competition." Regarding the content of the plan, he said that the reorganization "is mainly to strengthen the sales front and develop new business." KDD underwent organizational shake-ups in March 1988 and in January 1989, but this time the impact is expected to be much greater.

Other changes include the establishment of a new group tentatively called Business Development Headquarters; the downsizing of administrative affairs departments; the transfer of some businesses to affiliated companies; and the merger and consolidation of KDD Meguro R&D Laboratories and KDD Kamifukuoka R&D Laboratories.

In all, approximately 400 KDD employees will be transferred to avoid layoffs. KDD currently has 5800 employees with an additional 600 working in affiliated companies.

BellSouth, DEC ink marketing deal

Thomas Lanning, Assistant Editor

BellSouth and Digital Equipment Corp. have set up a cooperative marketing program that lets BellSouth offer customers a single point of contact for a complete range of voice and data services.

"We're enhancing DEC's VAX computer systems by integrating them with our voice solutions, which can be either central office-based or PBX-based," said Phyllis Blalock, product manager at BellSouth Services.

The marketing focus will be on end users with large customer service applications, she said.

BellSouth has been a reseller of DEC products for five years, but the present focus will be on computer integrated telephony and interactive voice response systems, Blalock said.

This is the first such agreement that DEC has established with any Bell regional holding company, said Steve Allen, DEC's product marketing manager for local area networks.

The company's range of products that can be marketed as part of the program includes data communications hardware and software, he said.

The total program, DEC said, will provide customers with access to network design, implementation, operational support, equipment installation, maintenance and remedial services.

AT&T to upgrade SW Bell cellular

Steven Titch
News Editor

AT&T Network Systems has signed a multimillion dollar contract with Southwestern Bell Mobile Systems to build digital cellular systems in four markets.

Under the terms of the agreement, AT&T Network Systems will supply Autoplex Systems for cellular operations in Kansas City, Mo., Wichita, Kan., Boston and Washington.

In Kansas City and Wichita, where Southwestern Bell owns the wireline franchise, AT&T Autoplex systems replace Motorola cellular equipment. In Boston and Washington, where Southwestern Bell owns Cellular One, the non-wireline franchise, the company will overlay AT&T gear on the existing Motorola network.

"Cellular demand has brought us to the point where we need to make substantial additions," said a Southwestern Bell spokesman. Southwestern Bell will deploy a 23-cell Autoplex system in Kansas City and a five-cell system in Wichita, he said.

In Boston and Washington, Autoplex systems will be used expand the capacity of the current cellular system, the spokesman said, adding that there are no plans for a complete changeout.

With this contract, AT&T is using the overlay scheme in the United States for the first time, according to Tom Powers, president of AT&T Cellular Systems, a unit of AT&T Network Systems, although he said the company did overlay an Autoplex system on a cellular network in Seoul, Korea last year.

"It's more typical to see a changeout," he said.

The Autoplex network will operate alongside the Motorola system, Powers said, using the same cell sites and anten-

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nas. "AT&T is working in the same area and territory," he said.

Subscriber calls can be handled by either system, but the systems can not hand off calls to each other, Powers added.

AT&T is currently working with Southwestern Bell on the design and engineering of the new systems. Construction is scheduled to begin later this year.

Ford offers factory-installed cellular phones

Ford Motor Co.'s Electronics Division has set up a national network to offer car buyers factory-installed cellular telephones as well as immediate service at the point of purchase.

The Ford Cellular System provides new car buyers with a phone, a number and on-line service from the moment they drive off the lot. The factory-installed phone is an option on 1990 Lincoln Town Car, Continental and Mark VII models.

As part of the arrangement, Ford has signed agreements with nine companies that own cellular operations throughout the country.

The providers are American Cellular Communications, Ameritech Mobile Communications, Bell Atlantic Mobile Systems, BellSouth Mobility, GTE Mobilnet Service, Nynex Mobile Communications, Southern New England Telephone's SNET Mobilecom, United States Cellular Corp. and U S West Cellular.

Ford "hand-picked" each provider after visiting the cities and trying out the service, a Ford spokeswoman said.

Although car dealers have been involved in the sale of cellular services for several years, car manufacturers only now are beginning to offer factory-installed models.

Analysts attribute the delay to the long lead-time it takes for cars to get through the research and development process. Though it has taken some time initially, car companies most likely will accelerate their participation in cellular. Factory installation lets car companies avoid the problem of electronic interference that cellular phones sometimes cause, especially in cars with a high number of microelectronic components, said Herschel Shosteck, a cellular market analyst with Herschel Shosteck Associates.

Maturing Industry *continued*

most people understand that free technical support does not go on forever," said Richard Burkhart, Pratt & Whitney president and chief executive officer.

MCI and US Sprint, which battle with AT&T for long-distance users, are also hunting for 900 clients. Both carriers offer interactive capabilities and advanced features and have experienced rapid growth in revenue and usage minutes. Both have had some early, limited success attracting corporate users.

Earlier this year, Sprint Gateways introduced a 900 marketing tool designed to help the carrier attract large corporate customers who are unwilling to take the 900 plunge without some assurance that they will reach their market.

The service, Targetlist, matches the 900 caller's number, captured with automatic number identification (ANI), with names, addresses and demographic information in the Donnelley Marketing database, the largest consumer household database in the country. Sprint Gateways then sells these lists back to 900 service providers, or to any other business looking for demographic information.

Telesphere is also selling ANI-generated lists. The carrier offers Prizm 900 and Directory 900, both of which use a database dip to retrieve information about 900 callers.

While not as well known as "The Big Three," Telesphere has been something of a trailblazer in the 900 field. Its efforts have paid off; the carrier currently carries about 1500 programs, which the company claims make it the biggest 900 service operator in the industry. Telesphere's success is typical of the still-infant 900 industry and shows that with hard work and innovation, 900 services can pay off for carriers in a big way.

Direct line to the American dream

Entertainment is, and probably always will be, the king of 900 numbers.

Successful 900 numbers in the past have allowed callers to stay in step with The New Kids on the Block, get the latest diamond wisdom from baseball star Jose Canseco and catch up with the devilish deeds of their favorite soap opera villains. If you're into *glasnost*, just last week a California marketing consultant inaugurated a 900 line that will keep you up-to-date on Mikhail Gorbachev.

These passive 900 numbers have helped sculpt a new image of the laid-back couch potato: Instead of gripping a television remote controller, they hold telephones in hand.

But the addition of interactive capabilities to 900 services may help change that passive reputation. Move over Pat and Vanna, the 900 interactive game show is here.

One of the first and most successful examples of 900 interactive games is "The Game," a 900 number offered by 900 Million Productions, a Los Angeles-based company. Callers pay $2.99 per call to compete against up to eight other contestants by keying in numerical answers to trivia questions using dual-tone multifrequency phones. Winners are given an 800 number and allowed to compete for free in subsequent rounds. "The Game" promises to pay out a $1-million grand prize to contestants who win seven consecutive rounds.

And that's just the beginning of the entertainment capabilities of interactive 900 service, according to Stephen Reynolds, Link Resource's senior analyst-voice services. Reynolds sees 900 service as a bridge to the multimedia information lifestyle of the future. One emerging application is interactive television, which would let viewers call a 900 number to choose camera angles for sporting events and interact with other television shows.

Until that time, however, the 900 telephone game will have to suffice. A slew of interactive telephone games launched of late include games based on television staples such as Family Feud, Jeopardy and Wheel of Fortune. None of these 900 numbers sell, promote or offer information. They are games, plain and simple, and big cash prizes are the draw.

"Only in America is it possible to win $1 million from the privacy of your own home," said Lynn Folse, vice president of 900 Million Productions. "For the first time, people can use their phones for a direct line to the American dream."

Telephony

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PAGING COMPANIES REMAIN OPTIMISTIC

But BT's folding of Metrocast casts doubts on nationwide paging

AT&T MULLS INT'L SATELLITE NET

Two new satellites would increase international circuits

MONDAY, JULY 16, 1990 Volume 219, No. 3

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS

An explosion of new products from major vendors has swept the ISDN CPE market off its feet. A whirlwind of BRI and PRI services from LECs and IXCs may soon follow.
Cover photo by Troy Thomas

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ISDN CPE bursts on the scene

There has been an explosion of ISDN CPE products from major vendors this year that will affect ISDN deployment in the years to come

WILLIAM C. KANUPKE

1990 has been a very good year so far for the ISDN customer premises equipment (CPE) industry.

The prospect of integrated services digital network basic rate interface (BRI) and primary rate interface (PRI) bearer services from both local exchange carriers and interexchange carriers has significantly increased the number of marketplace players who are designing CPE during a period of technology and market volatility. And there have been an unprecedented number of new product and feature announcements for this relatively new industry.

As Figure 1 depicts, ISDN BRI and PRI line shipments continue to increase, offering users the opportunity to evaluate and test business applications, ISDN CPE and new public network capabilities.

The ISDN CPE industry is the offspring of the marriage of telephony and digital data. The need to use network intelligence and increased feature functionality that is made available through D-channel signaling was no small part of this architectural challenge.

D-channel signaling allows new generations of intelligent CPE to make their way into the customer environment, which in turn creates new demands for increased product functionality. But it will be the death of early generation ISDN CPE that cannot accommodate user-to-user signaling-access feature sets—including a multitude of supplementary services.

During the past three years, the number of companies offering ISDN CPE has increased from 15 to more than 100. The industry can expect other firms to announce ISDN products as well as OEM alliances between manufacturers, software developers and equipment resellers. New market entrants are seeking financial backing to fund and support product development.

The ISDN CPE industry will serve as a key barometer to measure the health of the ISDN marketplace, including its major contribution—platforms for user applications. Our analysis highlights various ISDN market segments and announced offerings. It also discusses the near-term challenges that will increase the popularity of existing ISDN CPE applications and expand user acceptance of ISDN.

ISDN CPE offerings on the market today include telephones, terminal adapters, personal computer terminal adapters, ISDN PBXs, host computers, voice messaging systems, local area network (LAN) terminal adapters, ISDN multiplexers, automatic call distributors, ISDN packet assemblers/disassemblers (PADs), ISDN premises controllers, Groups III and IV facsimiles, telemetry devices, ISDN integrated voice-data workstations, ISDN test and diagnostic products, and ISDN CO emulators/simulators.

Message-oriented Signaling

Message-oriented signaling is one of the fundamental advantages of ISDN that has significantly affected traditional CPE and voice and data applications. The D channel and the signaling messages it carries are what differentiate ISDN from existing inband network signaling. The D channel provides

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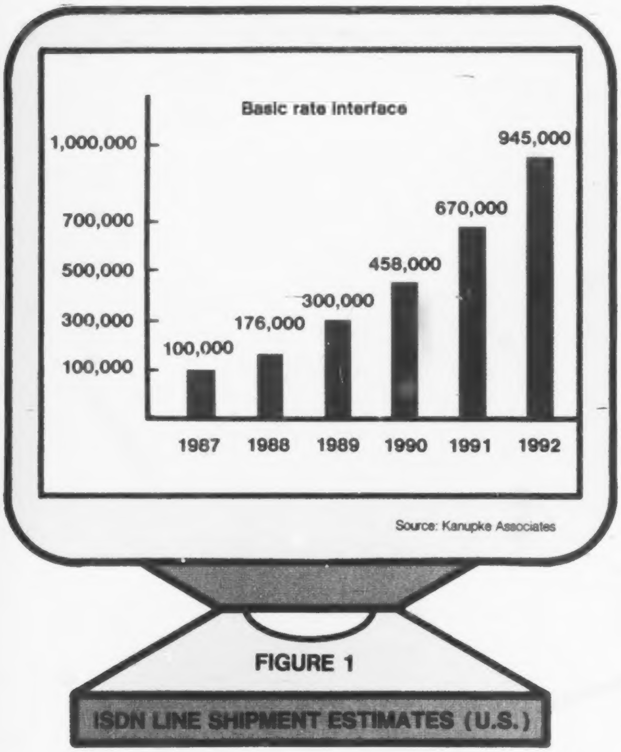
one standard signaling mechanism for all CPE services and for all ISDN CPE.

The D channel extends network CCS/SS7 out-of-band signaling to the customer premises, thereby providing intelligent CPE that offers users faster call set-up and connection compared to existing analog call set-up procedures found in modems and POTS phones. New CPE technology incorporates CCS/SS7 network signaling access, which is important for many of the ISDN applications that have non-circuit related signaling requirements or use extended user facilities—for example, closed user groups.



Source: Kanupke Associates

FIGURE 1

ISDN LINE SHIPMENT ESTIMATES (U.S.)

The D channel significantly enhances customer control of network services, CPE offerings and use of end-to-end signaling channels for applications independent of bearer channels, or those that use the 16-kb/s D channel without associated B channels. By taking advantage of the D-channel message sets and user-to-user information elements, customers can dynamically allocate the capacity of their access lines and select the network services they desire. This increased flexibility offers dynamic bandwidth-on-demand, bandwidth-on-reserve and permanent bandwidth of D-associated B channels, allowing network management features not available in analog modem networking products.

In some respects, terminal adapters can be considered multiservice protocol/format converters because they connect non-ISDN terminal equipment to basic rate (2B+D) or primary rate (23B+D) interface structures. Terminal adapters are available in either stand-alone versions or in-slot card designs for PCs and workstations.

The stand-alone units connect PCs, workstations, asynchronous and bisynchronous devices, SNA/SDLC terminals, facsimile units and video terminals to the ISDN network. Some of these units are data-only and can include RS232C and V.35 interfaces, both B- and D-channel support for circuit or packet switched services, rate adaption and X.25 access. Terminal adapters enable the non-destructive migration of non-ISDN desktop devices into the ISDN environment. One of the trade-offs is that terminal adapters may not be cost effective over the long term since most electronic interface cables connect to the particular device through the RS232C leads, which limits the speed to no more than 19.2 kb/s.

One of ISDN's target adaption markets is the IBM 3270 terminal population that uses coaxial terminal controllers. Terminal adapters are necessary for coaxial adaption (elimination) of IBM 3270 terminals, 3174/3274 establishment controllers and 3745 front-end processors. By using the coaxial adaption (elimination) functionality, IBM users may take advantage of the public ISDN instead of costly leased lines and modems, or wide-area Systems Network Architecture networks.

Terminal adapters can be used to connect a wide range of non-ISDN interfaces to ISDN. These include LANs, facsimile machines, host computers, private networks, protocol converters, multiplexers and industry-specific terminals such as those used in the banking and retail industries. A series of recent announcements by AT&T and Rockwell/CMC have introduced PRI connections for establishment control units and VMEbus Unix computers and workstations, thereby enabling these products to benefit from H-channel bandwidth at speeds between 384 kb/s and 1.536 Mb/s over public ISDN.

Many companies currently offer terminal adapters, including AT&T, NCR, Fujitsu, Universal Data Systems, NEC, Infotron, Harris, Racal, DGM&S, Siemens, IBM, Northern Telecom and Gandalf.

PC Terminal Adapters

Personal computer terminal adapters may be in-slot or stand-alone for the PC to adapt non-ISDN PC terminal connections to the ISDN transport. A BRI PC terminal adapter provides access to two, independent bidirectional, 64-kb/s B channels that can be used for voice, circuit-switched and packet-switched data, and one 16-kb/s channel used for signaling.

Some BRI PC terminal adapters provide voice capabilities through a standard telephone connected to a RJ11 modular phone jack built into the PC terminal adapter. This functionality enables a PC user to dial on an external 2500 set from the PC keyboard or to autodial using a directory application residing within the PC. When incoming telephone calls are received by the PC, an on-board tone ringer or visual ringing display alerts the terminal user.

PC terminal adapters that interface with IBM PCs, IBM compatibles or the recently announced Apple Macintosh use the PC as a multiservice ISDN device.

Enhanced in-slot terminal adapters using digital signal processors will have the processing capacity to allow the current generation of PC terminal adapters to store and retrieve voice messages and announcements. Vendors with a vested interest in this market include Apple, Metaplus, AT&T Network Systems, Infotron, Vadis, IBM, Teleos, NCR, ICL, AT&T-BMG, Wang, Apple, Hewlett-Packard, DGM&S, Hayes, Progressive Computing, Trillium, Siemens, Natural MicroSystems and Texas Instruments (DSP).

Although terminal adapter interfaces are limited to 19.2 kb/s, PC terminal adapters terminate and support speeds of up to 64 kb/s over a single B channel and 144 kb/s if the PC terminal adapter can terminate full 2B+D. This capacity is attractive for image and fax applications that require higher-speed devices for quality and resolution. Transition to the higher bandwidths may come much slower due to network control and signaling software that must be integrated with PC terminal adapters in a user-friendly manner.

The PC terminal adapter market emerged to funnel 64-kb/s data files to PCs. Now it is expanding to connect ISDN to LAN servers and IBM PS/2 Micro-Channel units. Recent announcements by AT&T provide PC connections to ISDN behind the PBX, thus offering ISDN functionality and supplementary service support to PCs through the ISDN-equipped PBX.

The PC terminal adapter market has rapidly expanded from a handful of players in 1988 to more than 30 participants worldwide. PC terminal adapter prices, considered by many users to be too expensive, have remained between $1200 and $1500 for the past 18 months. AT&T Network Systems' recent product announcement for a PC terminal adapter priced under $500 is expected to spur price reductions by other manufacturers for less-functional PC terminal adapters.

The chicken-and-egg opportunities still exist for the PC terminal adapter. Until PC terminal adapter vendors agree on a standardized applications software interface, significant user-sponsored applications development will still be hindered by PC terminal adapter proprietary programming interfaces offered by suppliers.

Apple's recent announcement for its non-standardized applications development kit will attract a stable of third-party Apple software developers to begin applications design. The non-standardized NETBIOS offering is similarly attracting applications development for IBM PCs and LAN networking. But users will not spend significant sums of money to decouple their application environments from de facto vendor configurations until a standard interface exists.

ISDN PBXs

In February 1989, AT&T announced the Definity PBX, which combined its System 75 and System 85 PBXs. This merged architecture also included ISDN primary rate physical interfaces for connection to carrier ISDN offerings. Siemens, Northern Telecom, NEC, Hitachi, Alcatel and others also have announced primary rate physical level interfaces.

PRIs enable the PBX to access a wide variety of public and private network services and facilities such as ISDN primary rate service access, call-by-call carrier selection, ISDN private networking services, automatic number identification delivery, multiservice bearer channels (B, H0, H1x), backup D-channel services and international ISDN PRI services.

PBX vendors with BRI behind-the-PBX connections allow data terminal access to ISDN and connection with integrated communications applications. By supporting ISDN BRIs, PBX vendors will be forced away from proprietary digital voice terminals and PBX-specific in-band signaling support. This change will allow PBX customers to use ISDN station equipment that best fits their specific application.

To entice users to use ISDN PBX functionality, PBX suppliers will have to focus on value-added applications offerings instead of physical connections. A PBX-attached automated call distribution (ACD) function is one example of value-added capability through the PBX for telemarketing and customer service offerings. By including additional functionality, PBX suppliers maintain customer control and achieve incremental sales revenues from ISDN terminals and software development.

LECs have begun to realize the potential revenues available by offering PBX-to-CO connection services via PRI. If the ISDN PBX can connect to the Class 5 office, the amount of bypass can be reduced and LECs can generate new service revenues. Discussions among the Bell regional holding companies indicate that Nynex, Ameritech, Pacific Bell, Bell Atlantic and Southwestern Bell will file PRI tariffs this year. AT&T, Northern Telecom, Siemens, Alcatel, NEC, Hitachi, Rolm, InteCom, SRX and Toshiba all offer ISDN PBX features.

Premises Controllers

In 1983, T-1 multiplexers appeared as the basic point-to-point products that communicated between two locations over the 1.544-Mb/s facility. Since mid-

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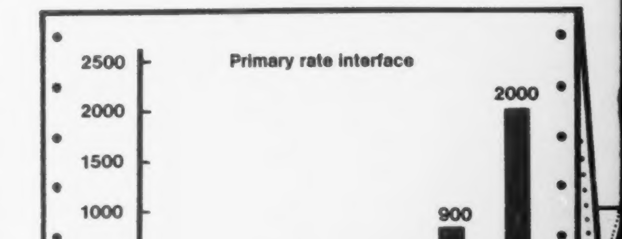

1984, the T-1 multiplexer offered multitrunking, software-controlled capabilities that also included dynamic routing, bandwidth management, compression and a list of other features.

ISDN's signaling functionality requires new product capabilities that must terminate the complex ISDN protocols for both line (BRI/PRI) and trunk (BRI/PRI) support and packet mode architecture that is available with ISDN. These products must be able to use one D channel in a PRI trunk to control multiple B channels (H0, H1x) and even to control multiple PRIs. Additional product functionality includes the interface to non-ISDN PBXs and interfaces to digital PBXs and host computers.

ISDN Premises Sets

The new generation of ISDN premises sets will include two essential requirements for wide user acceptance. First, they must accommodate new network signaling services with non-voice functionality; that is, facsimile, video, data and imaging. Second, they must ensure the continuity of existing voice telephone service while the data function is provided in a non-intrusive way.

ISDN electronic key premises sets provide a BRI, and have memory storage and alphanumeric display for calling name and number display, and a data terminal interface for RS232C or V.35 non-ISDN terminal connections.

When configured to provide an integrated data terminal interface, the premises set becomes part of a multiservice configuration of up to eight different physical devices, some of which may be asynchronous or bisynchronous non-ISDN terminals using terminal adapters to adapt to the ISDN switch. This type of personal communications over twisted pair makes the concept of a personalized communications center (PCC) possible.

The ISDN PCC concept offers enormous potential for direct handling of all types of information streams via ISDN technology without interference from traditional MIS/telecommunications departments. Incoming call applications such as telemarketing, service orders, catalog sales, wholesale distribution and reservations will have a totally different architecture once database information regarding the virtual application can be linked to the ISDN PCC, or vice versa.

ISDN PCCs will evolve to provide additional functionality that is unavailable on PCs, PBXs, key systems and POTS phones and will appeal to medium-sized and fast-growing businesses. These include additional call appearances, display information, calling number identification services and multimedia capabilities such as windowing of personalized graphics, video, imaging and data on one high-definition color screen.

AT&T, Northern Telecom, Siemens, Ericsson, Eagle Telephone, Fujitsu, NEC, Telrad and Panasonic all provide ISDN premises sets.

Standard ISDN CPE interfaces will result in a wide selection of terminal and systems products available to the customer, potentially at a lower cost. Also, with standard interfaces, terminal portability between building and facility locations will be easier, whether it is from a common user network to an ISDN PBX or from one country to another.

Based on current ISDN installations, it is clear that ISDN must be implemented using switches from only one vendor. At this point the two major CO switch vendors have not yet announced dates for complete multivendor carrier interconnectivity and CPE interworking and portability.

Recently the RHCs have been stressing the need for CPE vendors and switch suppliers to conform to Bellcore's technical requirements, which describe basic call control and signaling features and supplementary services. In spite of telco pressure for specifications compliance, full implementation of the published Bellcore requirements will not occur until 1991.

At this time, interworking and multivendor interconnectivity will give ISDN users end-to-end connectivity in the major regions. Full end-to-end ISDN ubiquity may be elusive since there are over 250 Independent telcos with less than 1000 subscribers.

Future ISDN CPE

The emerging intelligent network services are changing future ISDN CPE functionality expectations and the type of applications that can reside within the ISDN CPE. What characterizes the intelligent network-coupled ISDN CPE is not widely recognized.

From the ISDN CPE side, circuit and packet switching capability, D-channel functionality, desk-to-desk digital connectivity for voice and data, integrated access to carrier services and several other vistas already have been described. It is not clear at this time whether the intelligent network infrastructure will complement, or be competitive with, intelligent ISDN PCC (CPE) networking. Only time will tell.

The evolution of the PC, the ISDN PC terminal adapter and the ISDN PCC can potentially create thousands of applications that can take advantage of the ubiquitous network intelligence provided by ISDN. Some of the possible multimedia service offerings that might be tariffed by telcos soon include message services, calling number display, message waiting, leave word calling, videoconferencing, reservation services, facsimile distribution, call management, compression, desktop conferencing security and voice encryption.

But if all devices, services, or applications running on an ISDN bus are not push-button friendly, the low-priced PCC concept will not capture the small and medium-sized businesses or home consumers in the same way that word processing and spreadsheets have. ■

William C. Kanupke is President of Kanupke Associates, Haddonfield, N.J.

Telephony

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A TOUGH GAME GETS TOUGHER

Intense competition will make the global CO switch market the fight to watch in the '90s

WILL RHC MERGERS BE NEXT?

GTE-Contel deal may start a mergers and acquisitions trend

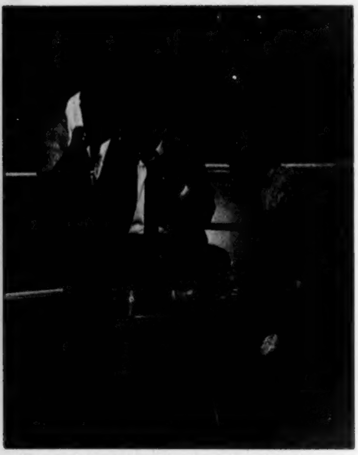
SIEMENS TO SUPPORT BELL ATLANTIC'S MAN

Vendor to work with QPSX in Temple University trial

MONDAY, JULY 23, 1990 Volume 219, No. 4

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS



Competition is heating up in the global central office switch ring. Market challengers have the chance to win a big purse, but they could end up with nothing to show but bruises, black eyes and empty pockets.
Cover photo by Comstock

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Competition comes to South Korea

MICHAEL GALBRAITH
Special Correspondent

South Korea's Ministry of Communications soon will announce a number of measures that will herald a new era in that country's telecommunications service industry. The changes will make South Korea the fourth country in the world to introduce competition in basic services.

Competition will be introduced for international business as well as for mobile communications. The full liberalization of the domestic and international value-added network (VAN) market also will be accelerated. The introduction of competition in the long-distance business has apparently been put off until the mid-1990s.

Competition will initially follow the duopoly pattern currently practiced in the United Kingdom.

"The size of the Korean telecom services market is rather limited," says Dr. Oh, Sung Baik, senior research fellow at the Korea Information Society Development Institute. "We need a step-by-step approach."

Data Communications Corp., called DACOM, is expected to be designated initially as the new competitor in international services, and possibly later in the long-distance business. In addition, by the middle of 1992 existing telecom legislation is scheduled to be overhauled and a new system for classifying carriers introduced. The system will be modeled after the Japanese system, which divides carriers into General Type 1 carriers that own their own circuits, Special Type 1 carriers and Type 2 carriers.

The MOC's plan for competition in the long-distance and international fields is being fought tooth and nail by the giant Korea Telecommunications Authority, the current monopoly provider of these services. KTA's revenues totaled almost $4.4 billion at the end of 1989. KTA was legally privatized Jan. 1.

The government was expected to list the company on the stock market beginning July 1 and sell off 25% of its shares in the first two issues. Unfortunately, the sharp decline of the South Korean market has led to the postponement of the first issue, probably until next year. Although they have offices in the same building, relations between MOC and KTA have been deteriorating.

DACOM is happy about the plan, but disappointed at not being able to get an immediate go-ahead to compete in the long-distance business. South Korea's second carrier had a turnover of $165 million in its last fiscal year but has been troubled since it was made sole provider of data communications services. It now has an excellent opportunity to find itself a more secure and profitable place in the basic services field.

The government's decision follows a long period of intense debate involving the government, academia and private industry that is reminiscent of what has happened in the U.S., the U.K., Japan and other countries. Having created the world's 10th largest service market, the government is trying to move from a quantity-oriented policy to a quality-oriented policy, and it sees deregulation as a key catalyst.

The future role of KTA has been a focal point of this debate, and the subject of its possible breakup also has been raised. The government has proceeded cautiously and sounded out every interest group because it is aware of the crucial significance of any changes. There were even several public hearings in which leading experts and leading representatives of the interested parties, including MOC, KTA and DACOM, publicly discussed and argued the issues. Over 300 people attended the last of these meetings.

MOC had promised to come up with its final plan by the end of June, but apparently has had difficulty winning the agreement of some of those people, especially within KTA's management and labor union, who are firmly opposed to parts of the plan. In South Korea, as in Japan, it is customary to negotiate a consensus.

The matters that have stirred the most controversy are the questions of competition in the long-distance business and the role of DACOM. Long-distance competition in particular is fiercely opposed by KTA. The most recent press reports indicate that MOC may have reached a compromise by permitting competition in international services to commence this year while putting off competition in the long-distance field until the mid-1990s.

The Seeds of Change

The current debate started in March 1989 when KISDI, MOC's telecom policy think-tank, appointed an ad hoc advisory committee to study the future of the information and telecommunications industries. The committee was chaired by former Seoul National University President Dr. Shin, Tae Hwan and consisted of 96 experts from various fields including universities, research institutes, the government and private industry. After six months of research, the committee presented its report last November.

The report recommended competition in every field, but said the government should take a step-by-step approach until the mid-1990s. It also called for a preparatory period lasting up to the mid-1990s before competition would be introduced, although the immediate introduction of competition in the mobile communications and international telecom fields was seen as advisable.

The report also said that enhanced services, the sector at the source of trade friction with the U.S. government, should be opened to competition as early as possible. Finally, the report suggested that although there should be no restraints on KTA's business activities, the administration must practice "fair competition."

MOC says that it accepted the report's recommendations.

"Early in 1990 the government decided to allow competition in basic transmission services and has since then been working out a detailed schedule in conjunction

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KOREAN TELECOM STATISTICS

Calendar year	1982	1983	1984	1985	1986	1987	1988	1989
Telephone switching capacity	4,492,660	5,337,450	6,290,172	7,538,598	8,905,462	10,221,746	11,239,443	13,354,150
Telephone subscribers	4,079,590	4,809,897	5,594,973	6,517,395	7,520,889	8,625,496	10,306,028	11,791,674
Telephone subscribers per 100 population	10.4	12.0	13.8	15.8	18.1	20.5	24.6	27.8
Public pay phones	70, 864	88,227	101,478	117,761	138,491	160,165	180,165	212,165
Public pay phones per 1000 population	1.8	2.2	2.5	2.9	3.3	3.8	4.3	5.0
Total telephone sets	5,229,221	6,035,763	6,984,577	7,917,227	9,288,464	12,227,234	12,414,978	14,195,000
Telephone sets per 100 population	13.2	14.9	17.3	19.2	22.3	29.1	29.6	33.0
Long-distance transmission circuits	128,652	158,208	183,830	192,642	201,215	222,181	265,032	356,520
Domestic leased circuits	49,312	56,701	65,722	75,286	87,893	103,008	126,496	169,587
International transmission capacity	1800	1872	2016	2188	3195	3622	4114	5386
International telephone circuits	750	946	1091	1294	1551	1863	2412	3960
Mobile subscribers	—	—	2700	4600	7000	10,200	17,500	39,700

South Korea *continued*

with industry and users," explains Mr. Cheon, Jo-Un, director of the planning division of MOC's Telecommunications Policy Bureau. "The government wants to improve customer benefits," he adds.

The status and role of DACOM in the new competitive environment has caused a lot of controversy. DACOM was established as a private corporation at the same time as KTA in April 1982. It is actually a consortium that is 34% owned by KTA but includes many of South Korea's major enterprises. Although it has been given a monopoly in data communications and enhanced services and the right to resell lines leased from KTA, DACOM has never really been profitable. This initially was due to the undeveloped nature of the market and more recently because it is being forced to relinquish its monopoly and face competition.

"We have a 10% outage nearly everyday on the lines we lease from DACOM," complains Jerry Thorson, executive vice president of Systems Technology Management, the 50-50 joint venture between Lucky Goldstar and Electronic Data Systems Corp. of the U.S. The company is one of DACOM's biggest customers and is pushing for greater market access, which would come at DACOM's expense.

DACOM lost its monopoly in enhanced services last July and is set to lose its remaining multiplexer monopoly due to the new policy changes.

"DACOM has become a big burden for the MOC," says one source requesting anonymity. Giving DACOM entry to KTA's long-distance business is clearly one way to compensate DACOM for the damage that VAN market liberalization will bring, and doing so hopefully would cure MOC's headache. Some experts—including many foreign observers—still see MOC as acting mainly to protect the interests of KTA and DACOM.

MOC reportedly prepared two alternative plans. One plan designates DACOM as the second carrier, while the other calls for a second carrier that is a consortium of private industry. The government, however, is reportedly reluctant to allow South Korea's major business conglomerates, the *chaebol*, to get too involved in the telecom service industry because of the almost unhealthy degree to which they already exercise dominant control over the South Korean economy.

KTA maintains a tough stance on the competition issue.

"We [in KTA] think that competition and privatization are inevitable but consider that it is too early for Korea. Only three countries in the world have introduced competition in basic services. Even major countries like West Germany and France don't have competition yet," says one KTA source. "Our attitude is that we should maintain our monopoly in basic services until 2000." The South Korean market for services is still relatively small—slightly over $4 billion compared with the $40-billion Japanese market. He says DACOM lacks the funds to build a long-distance network.

At the final public hearing on June 18, complaints surfaced about the possible designation of DACOM as the second carrier.

"A major worry is that, if DACOM becomes the second carrier, nothing will improve," says one industry expert.

Not surprisingly, officials at DACOM have a different view.

"If we get a license from the

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government, we can go public. We can raise funds very easily," says D.K. Kim, DACOM's managing director. Suggesting that DACOM's entrance into the long-distance field would have little impact on KTA revenues, Kim explains that it would take a long time to construct a long-distance network, and that DACOM would be targeting only a small market share—10% at the most. "We wish to offer new end-to-end, fully digital services to major business customers," he says.

One of DACOM's biggest problems from its inauguration has been that it never has had its own network. It always has had to lease facilities from KTA. Since May, DACOM has been offering its IBS high-speed international data communications service using Intelsat and an earth station on the roof of its main office.

As the government revises its public policy on telecommunications, it has had to face up to a lot of issues familiar to the U.S., the U.K. and Europe. KTA may be a monopoly suffering from too much bureaucracy and inefficiency, but it has been playing a pivotal role in meeting the government's obligation to provide public services nationwide and also in the plan to develop South Korea's information society.

KTA provides most of the funds for South Korea's grand research and development projects. An example is the TDX switching project being carried out by the Electronics & Telecommunications Research Institute. It also has launched a project to supply 10 million computers to the South Korean public by the year 2000 to help create the information society.

Nevertheless, the threat of competition has already awakened KTA to self-examination and produced some positive results. The tariff structure is being reformed and long-distance rates are being reduced. Since Jan. 1 the company simplified the corporate structure and has introduced accounting by service sector. At the same time KTA also is setting up subsidiaries to pursue new businesses such as CATV.

Although many see South Korea as another Japan, some experts point out that it is still a young, developing country. "Korea has problems with efficiency and social obligation, especially the need to lay basic facilities nationwide," explains KISDI's Dr. Oh. "The introduction of competition and the privatization of KTA is to improve efficiency, but there will be a trade-off between efficiency and obligation. There are still gaps between regions and income groups. Telecommunications should play a role in reducing these gaps. Competition cannot solve these kinds of social problems. That's why we need a balanced step-by-step approach," he warns.

Dr. Oh has modest aspirations for South Korea's future role on the world telecom stage.

"I hope that we can help undeveloped countries solve their serious telecommunications infrastructure problems. I believe that Korea can play a gap-filling role between North and South," he says. ■

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INDIANA BELL HITS THE JACKPOT

Telco plays a major role in the state's new on-line lottery games

BELLSOUTH FILES FOR PCN TRIAL

Company wants to be first RHC to test new wireless system

FCC BEGINS REBUILDING COMPUTER III DIKE

Commission takes steps to minimize damage from June court ruling

MONDAY, JULY 30, 1990 Volume 219, No. 5

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS

Indiana Bell hit the jackpot when it was chosen to oversee the installation of the new statewide Hoosier Lottery system with GTECH. Steven March, control room manager, is shown here in GTECH's control room in Indianapolis, which serves as a clearinghouse for more than 2000 lottery locations throughout Indiana. Cover photo courtesy of Indiana Bell

NEWS OF THE WEEK

10 BELLSOUTH SEEKS LICENSE FOR PCN TRIAL
The RHC aims to be the first to test PCN technology, and plans a two-year trial with as many as 300 users

10 FCC TAKES ACTION ON COMPUTER III
The agency keeps approved CEI plans intact while acting to minimize potential damage from a June court decision that overturned Computer Inquiry III

11 BELLCORE REALIGNS TO MEET NEW RHC NEEDS
The consortium restructures its technical services organization to reflect changes in the local exchange market for network technology and services

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The Bush administration and the telephone companies seek action on pending legislation that would let telcos enter the cable TV business

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By Marshall Swaringen. Instead of just waiting for catastrophes to happen or paying the costs of periodic maintenance, USAir has opted for a predictive maintenance program to keep its network running efficiently

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By Ken Edwards. By playing a major role in the project, Indiana Bell also became a big winner in Indiana's new lottery system

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By Gilbert Mauk. Armed with a thorough routine performance monitoring program, US Sprint happily faces a modern, all-digital network that is highly reliable

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the RHCs' current shared network facility agreements to update AT&T's billing validation application database will expire at the end of 1991.

GTE's LIDB, its first signaling system 7 application, contains 14 million line records and validates calls on-line as they are placed. It enables local exchange carriers and interexchange carriers to validate billed services, thereby providing a way for operator services providers to reduce fraud and to increase collectible toll revenues, according to Don Oas, senior product manager-SS7 services for GTE.

Fraudulent use of calling cards is rising nationwide, Oas noted, presenting serious problems for LECs and operator services providers. "It's a real complex problem. It's so prevalent," he said.

But LIDB service should help operator services providers reduce fraudulent card usage, Oas said. For example, Ameritech now can verify calls placed by GTE calling-card customers, he said.

GTE's LIDB contains all working telephone numbers capable of placing toll calls. Because of this, operator services providers for LECs and IXCs can use LIDB access for validation of calling cards, collect calls and third-number billed calls, Oas said.

An operator services system launches a validation query to an LIDB, which then determines the validity of the requested billing method and returns instructions to the operator system. Each LIDB contains a company's specific information, he said.

For each call, the LIDB can validate a calling card's 14-digit billing number. It can determine whether a billed line automatically rejects, accepts or requires verification of calls billed as collect or third number. And it can determine whether the billed line is a public phone. ▣

2ND QUARTER REVENUE RESULTS OF THE 7 RHCs AND GTE
(In millions of U.S. dollars)

	1990	1989
Ameritech	2680	2553
Bell Atlantic	3076	2882
BellSouth	3619	3469
Nynex	3437	3299
Pacific Telesis	2434	2407
Southwestern Bell	2170	2141
U S West	2411	2435
GTE	4579	4323

2ND QUARTER NET INCOME RESULTS OF THE 7 RHCs AND GTE
(In millions of U.S. dollars)

	1990	1989
Ameritech	352	317
Bell Atlantic	363	342
BellSouth	445	418
Nynex	301	279
Pacific Telesis	287	325
Southwestern Bell	262.5	261.5
U S West	276	257
GTE	364	329

CT2, DECT forces clash at meeting

John Williamson
International Editor

Although advocates of CT2 telepoint standardization recently defeated attempts in the European Telecommunications Standards Institute (ETSI) to block further CT2 development, CT2's rivals also are hailing the outcome as a victory.

At stake in the contest between supporters of CT2 and the digital European cordless telecommunications (DECT) system are research and development programs that already have consumed tens of millions of dollars, and a share of a regional market forecast to be worth almost $3 billion by 1995.

CT2, which was pioneered in the United Kingdom, is opposed by some supporters of the European Commission-backed DECT. Advocates of DECT fear that early introduction of the one-way CT2 telephone will distort the overall regional cordless market. Nevertheless, the U.K., West Germany, France, Spain, Portugal, Finland, Belgium and the Netherlands have now signed a memorandum of understanding to adopt a common air interface (CAI) version of CT2.

Of equal significance, ETSI's Radio Equipment and Services (RES-3) technical committee proposed last March to adopt CAI CT2 as an interim European telecommunications standard.

Such proposals must be ratified at ETSI's technical assembly. During the July meeting of this body, the Association of European Manufacturers of Pocket Communication Systems (ESPA) charged that correct rules and procedures were not being followed in the case of the CT2 proposal. ESPA is one of the main participants in the DECT standardization and development process. There was also concern that, although the original proposal had covered the use of CT2 solely for telepoint applications, the technical assembly now was being asked to consider cordless PBX applications too. DECT is slated to make its initial impact in the business office sector.

After studying the situation, the ETSI technical assembly found that there had been no irregularity and that work toward the provisional adoption of CT2 as an interim standard could proceed. "RES-3 will be continuing in a pragmatic way without prejudice," said Stephen Temple, chairman of the ETSI technical assembly.

Nonetheless, the crucial vote on whether to formally adopt CT2 as an interim standard was postponed until October.

The CT2 camp favorably regarded the overruling of the ESPA objection and calculates that by October the work required to finalize CAI CT2 into an interim standard will be nearly complete. To halt

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Telephony

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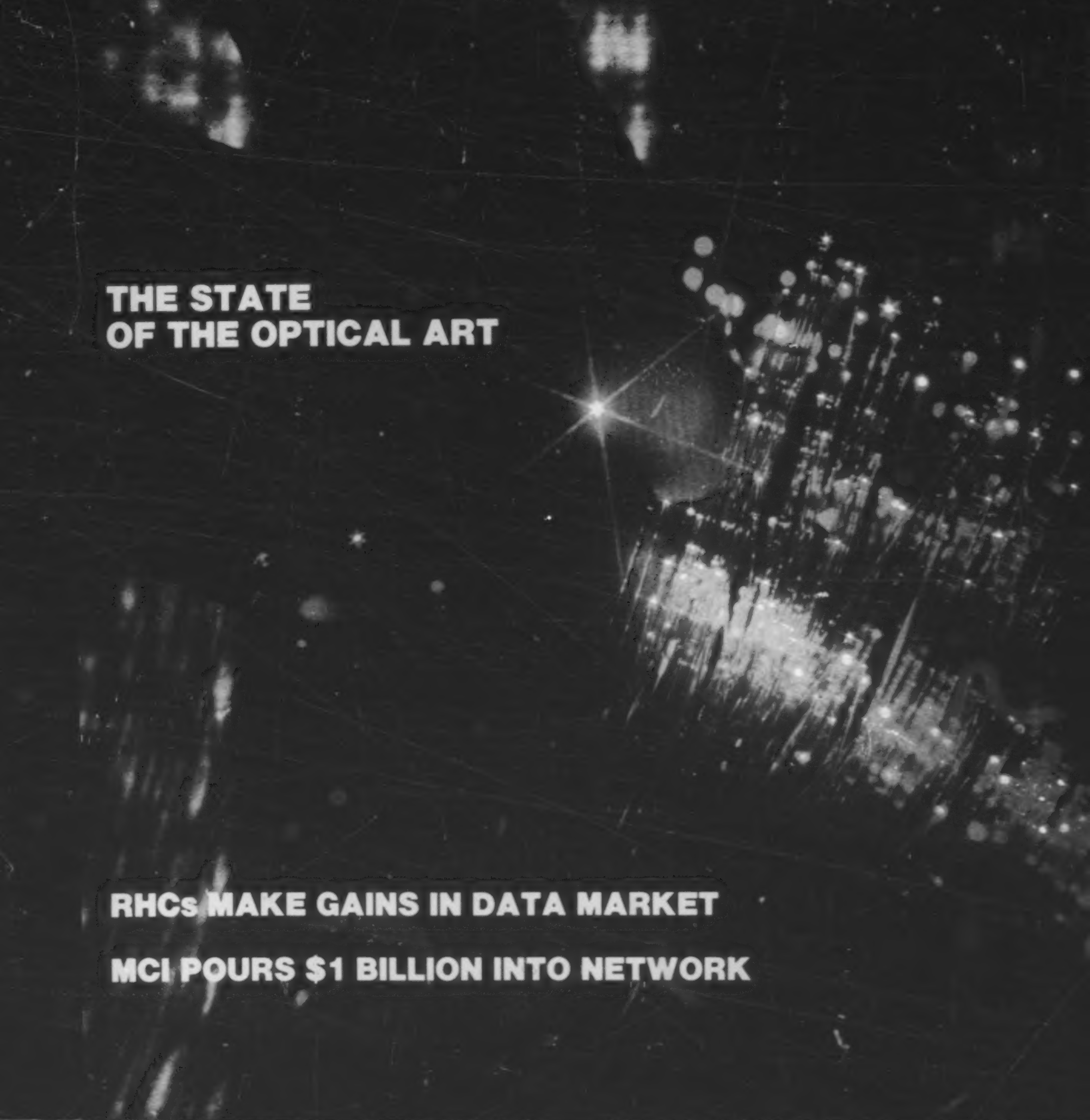

THE STATE OF THE OPTICAL ART

RHCs MAKE GAINS IN DATA MARKET

MCI POURS $1 BILLION INTO NETWORK

MONDAY, AUGUST 27, 1990 Volume 219, No. 10

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS

Research on fiber optics is nearing the point at which fiber cable will be as economical as copper. Researchers at British Telecom have helped to put a finger on the technology needed to get it there. Cover photography by Michael Stuckey, Comstock Inc.

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NEWS OF THE WEEK

8 RHCS' DATA SAVVY PAYS OFF
Traditionally slow on data, the Bell regional holding companies have begun making gains in the complex data services market

9 GREENE HEARS CASE FOR INFO SERVICES
In a rare joint filing, the RHCs say the time has never been better for lifting the MFJ restriction on information services

12 MCI PLANS $1.1 BILLION UPGRADE
The IXC will take a $500 million write-down in its plan to go all-digital by the end of 1991

12 SPRINT REVAMPS SALES FORCE
The company streamlines its national sales organization and refocuses its efforts on crucial mid-level businesses

17 CONTROVERSY IN THE CARIBBEAN
As many as 25 companies are interested in bidding on the Puerto Rico Telephone Authority, while unions charge the government with selling out ''national patrimony''

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By Jill Rasmussen. You can bet that equipment soon will have to pass ISDN tests to connect to any European ISDN. Right now, two organizations have set up different sets of standards

40 THE STATE OF THE OPTICAL ART
By Alan Simpson. Recent fiber optic research is bringing the technology to the stage at which it can compete favorably with copper. Here's a look at some of the European advancements

44 THE WORLD IS BECOMING THE RHCs' OYSTER
By Leslie A. Taylor. The Bell regional holding companies are no longer just telephone companies, and they're not information companies either. Thanks in part to Judge Greene, the RHCs are fast becoming international information companies

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The world is becoming the RHCs' oyster

Regional is hardly an accurate description of the holding companies' setup to control the Baby Bells. Each one of the seven Bell regional holding companies has spread its wings and is flying high internationally

LESLIE A. TAYLOR

Telephone companies? Not exactly. Information companies? Getting closer. International information companies? Now you're getting the idea.

The seven Bell regional holding companies increasingly are taking their business experience and investment dollars overseas. Six years ago, following divestiture, these companies relied almost exclusively on revenues from local exchange service and telephone directories. Their domestic expansion opportunities were further limited by the Modified Final Judgment. Overseas expansion was much less restricted. It is not surprising, then, that the RHCs vigorously invested in numerous offshore ventures including cable television (CATV), cellular radio, computer consulting and personal communication networks (PCNs).

The RHCs are involved in at least 25 different activities in more than 36 countries. The diverse list includes traditional areas such as cellular and paging networks including the new PCNs, international fiber optic cables, packet switching, voice messaging and directory publishing.

It also encompasses less traditional endeavors: banking, including software, computer services, electronic funds transfer, and financial services; network design, engineering and management, and systems integration; computers and software; facility design, engineering and management; consulting and professional services, including international joint account management; and marketing, training, fundraising and publishing.

The RHCs also are taking advantage of opportunities in areas in which they are restricted in the United States, particularly CATV and information services.

The variety of endeavors reflects the diverse approaches of the different RHCs. Ameritech, Bell Atlantic and Southwestern Bell have approached international ventures cautiously, preferring to develop strategic relationships with overseas partners with ongoing multinational activities. The others—BellSouth, Nynex, Pacific Telesis and U S West—are involved in several ambitious international projects.

While most RHC activity has been in Western Europe and is likely to remain that way—except for expansion into Eastern Europe and the Soviet Union—the RHCs do have relationships and ventures all over the world (Table 1).

TABLE 1
WHERE ARE THE RHCs?

Argentina
Austria
Australia
Belgium
Canada
Caribbean nations
Colombia
Germany
France
Gibraltar
Hong Kong
Hungary
Italy
India
Israel
Japan
Korea
Malta
Mexico
Netherlands
New Zealand
Norway
People's Republic of China
Peru
Philippines
Singapore
Spain
Sweden
Switzerland
Taiwan
Thailand
United Kingdom
Soviet Union
Uruguay
Venezuela

Driving Forces

Domestically, the RHCs have recognized that the local loop is no longer the exclusive purview of the local exchange carrier and that only modest annual growth of about 5% can be expected in that area. Within the U.S., they have diversified as much as possible within the confines of the MFJ and U.S. District Judge Harold Greene's willingness to grant waivers.

This diversification is evidenced by the increasing portion of RHC revenues that are now derived from unregulated activities (Figure 1). In 1985, the RHCs derived an average of 14.4% of their revenues from non-telecommunications, unregulated activities; in 1989 an average of 21.47% of their revenues came from such services. The increased level of RHC investment overseas in the past four years, most of which has been in unregulated activities, is beginning to contribute to this figure and can be expected to make an even greater contribution in the future.

It will be four or five years, however, before many overseas ventures achieve the satisfactory levels of return—between 14% and 18% and higher—that the financial community wants to see. It will take this long because of the enormous capital investment required for new cable and cellular franchises and because of the RHCs' need to establish them-

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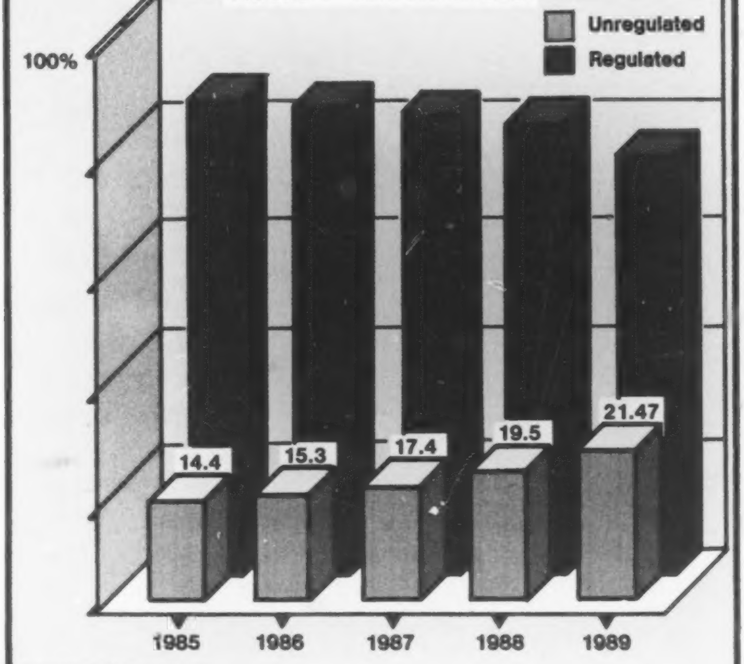
FIGURE 1 RHC REVENUES



Source: RHC annual reports

The RHCs' Oyster *continued*

selves in markets in which they are essentially unknown.

My recent study on RHC overseas investments came to the conclusion that the RHCs were "pushed offshore" by Greene's lack of flexibility with regard to domestic ventures compared to his willingness to permit the RHCs to pursue virtually any type of activity overseas.

Coincidentally, the RHCs were in the "right place at the right time," the study shows, as overseas administrations began to liberalize their approach to telecommunications and permit competition in the provision of certain services. Western Europe hastened the pace of deregulation with its decision to move to a unified economic structure by 1992.

They're Everywhere

Because worldwide CATV and cellular systems are a few years behind those in the U.S., the RHCs have been able to gain access to those markets at an early stage and in some cases have become major competitors of the established carriers.

TABLE 2 RHC OVERSEAS CELLULAR VENTURES

Country	RHC/Partners	Status
Argentina	BellSouth (54%), Motorola, Citibank, Socma, BGH, Astra	In service
France	BellSouth (4%), Compagnie Generale des Eaux, Nokia, Racal	In service
Hungary	U S West/Magyar Posta	Won license
Japan	Pacific Telesis/Metrophone	Bidding for second Tokyo system
Mexico	BellSouth, Sociedad Industrial Hermes, Banamex, Fabricas del Calzado Canada, Racal	Won license for part of country
Uruguay	BellSouth	Won license

In cellular, the RHCs are literally everywhere (Table 2). They already have invested more than $2 billion overseas, and there will be even more investment in the next few years.

The RHCs are getting the opportunity to practice the information and CATV businesses overseas away from close scrutiny of the U.S. market and U.S. competitors. Right now, the RHCs are banned from these businesses in the U.S. They're even getting experience in new services, particularly in PCNs, which are not yet available in the U.S. The RHCs' international experiences obviously will stand them in good stead if they are permitted to enter these markets in the U.S.

Apart from gaining actual experience in installing and operating these systems, the RHCs are learning more about joint ventures, partnerships and competition for government licenses and franchises. Some of their efforts during the past two years with regard to cable and cellular franchises demonstrate that the companies are on a learning curve. In many of the competitions, the RHCs have vigorously competed against each other, which has resulted, in some cases, in financial commitments that could reduce the potential for adequate financial returns.

In 1989 for example, West Germany conducted a competition for the franchise to build and operate a second digital cellular network to compete with the analog network already provided by Deutsche Bundespost. Ten international consortia competed for the license. In one of the first examples of RHC cooperation overseas, Ameritech and Bell Atlantic participated in the same consortium. BellSouth, Pacific Telesis, Nynex and Southwestern Bell all participated in separate consortia. Only U S West did not bid.

The winning consortium includes Pacific Telesis (with a 26% share), Mannesmann AG, Deutsche Genossenschaftsbank, Cable & Wireless, Lyonnaise des Eaux and the National Associations of Electrical and Automobile Trades. The investment is ex-

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pected to be between $1 billion and $2 billion over the next three to five years, and up to 350,000 subscribers are projected by 1995.

U.K. CATV franchises also have attracted heated competition among consortia that include several RHCs. Although most of the largest franchises were awarded before they came into the picture, the RHCs—as partners in consortia with both U.S. and foreign firms—have competed for the remaining franchises in London, its suburbs and less populated areas of the U.K. RHCs are involved in CATV systems serving 25% of the U.K.'s 15.4 million cable-accessible homes (Table 3).

TABLE 3 RHC CABLE SYSTEMS IN THE U.K.

RHC	System/Partner	Homes (000s)
Pacific Telesis	Masada	1390
	Jones Intercable	456
	Oyston	225
SW Bell	Oyston	225
Nynex (six franchises)	US Cable (Manchester)	915
	Cross Country/Comment	585
U S West	Cable Corp.	115
	Cable London	166
	London South	385
	West Country	385
	Comment Cablevision	355
	Cablevision Edinburgh	175
	Cablevision Birmingham	465
	United Artists	2000

One attraction of CATV franchises in the U.K. is that information services may be provided along with programming, affording additional opportunities for development of services and revenues. In France, however, where BellSouth is involved in CATV ventures, only cable programming is permitted.

Actions of the U.K. government may put a damper on the RHCs' flexibility to provide information and even telephony service through their cable systems. But the U.K. is undergoing a review of its shift several years ago to a duopoly in the provision of telecommunications services, and there are signs that British Telecom would like to see competitors somewhat less free to compete, particularly concerning what British Telecom regards as basic services.

It's Their Thing

Because the MFJ does not restrict the RHCs on operations completely outside the U.S., they are starting to get involved overseas in what they do best—providing basic telephone service. Bell Atlantic and Ameritech made a big splash this summer when they announced their intention to purchase a 49% share of New Zealand Telecom Corp. for $2.46 billion.

One smart reason for RHCs to buy interests in foreign telcos is to control both ends of the charges—and profits—on overseas phone calls. For now, this situation puts them on the other side of the deficit in U.S. settlement rates on overseas calling. Set by each foreign government, these high accounting rates have resulted in a deficit to U.S. carriers that has soared from $78.3 million in 1975 to $1.6 billion in 1988, according to a Federal Communications Commission report (Industry Analysis Division report of December 1989), mainly as a result of increased calling.

The FCC proposed extensive reform of the international accounting rate structure in July, but it will require cooperation by each foreign PTT to bring the accounting rate in line with cost.

If the foreign telecom infrastructure is sound—and this is a big "if"— these companies are potential cash cows for the RHCs. Such investments, however, are not without potential hazards. If Greene does not grant a consent decree waiver to Ameritech and Bell Atlantic to provide long-distance service between New Zealand and the U.S., it will cost millions of dollars to reorganize the long-distance operations. In addition, it will be more difficult for other RHC purchases to go through.

A number of other concerns have been raised within the industry and among regulators and users. Concerns center around the cost of these purchases; how these investments affect the domestic ratepayer (for example, possible cross-subsidization from regulated to unregulated activities and whether windfall profits are funding foreign acquisitions); and whether upgrading domestic networks and serving customers will be neglected for massive foreign projects.

With the fall of political barriers in Eastern Europe, the RHCs, not surprisingly, have offered their considerable expertise in telecommunications infrastructure. Because of the poor state of telecommunications in most of these countries, some are looking at cellular systems to create an "instant infrastructure." And the RHCs want to get their foot in the door to possibly provide basic phone service to such countries as Czechoslovakia, which currently has 12.5 phone lines per 100 people, and Hungary, with 6.2 lines per 100 people.

U S West has been awarded a contract to construct a 10,000-subscriber cellular network in Budapest, Hungary. A consortium that includes Bell Atlantic and U S West will construct a cellular system in Czechoslovakia. Along with a $60-million cellular investment, the two RHCs also will build a public switched packet data network for Czechoslovakia to help the Czechs modernize their antiquated telecommunications infrastructure.

Other RHCs are talking to various Eastern European administrations and the U.S. government, which is considering the easing of export restrictions to the former Communist bloc countries. COCOM, a 17-member export control group dominated by NATO countries, approves export of high-technology equipment to Communist bloc and former Communist bloc countries. Relaxation of COCOM rules would open Eastern Europe to a variety of foreign enterprises.

Apart from CATV, cellular radio, private communication networks, computer consulting and technology transfer, three of the RHCs have sought involvement in international telecommunications facilities. Although Nynex was thwarted by Greene in its efforts to acquire an ownership interest in the PTAT private trans-Atlantic cable, Pacific Telesis was permitted to own up to 10% of the Japanese end of a private undersea Pacific cable. The cable is owned by Japanese-based International Digital Communications, a consortium that includes Pacific Telesis, C. Itoh, Toyota and Cable & Wireless.

In December 1989, U S West announced the formation of a consortium to build a fiber optic telecommunications line linking Japan, the Soviet Union and Europe. Its partners include the Soviet Ministry of Posts and Telecommunications and six other international telecommunications companies. The cable is expected to cost $500 million and take between three and five years to complete.

U S West is facing opposition from the National Security Agency, which prefers the current Soviet reliance on radio-based communications. In July, the U.S. Department of Commerce recommended denial of U S West's request to participate in the trans-Soviet fiber project.

Additional forays into international telecommunications facilities are likely as such facilities, including many privately sponsored ones, proliferate. Involvement in international facilities by the RHCs demonstrates their understanding of the rapid growth in international telecommunications (averaging 18% each year over the past five years) and a desire to strategically position themselves for the day when they may be able to re-enter the U.S. interexchange market.

The RHCs are becoming global companies. Even Ameritech, which has taken a cautious approach to international activities, established an international division in May with Andres Bande at the helm. Bande previously led U S West in its aggressive efforts internationally, which included in the past two years obtaining CATV franchises in Hong Kong, the U.K. and France. U S West also is in involved in one of the U.K. PCN consortiums.

What does this globalization mean? In the short term, it means a great deal of capital investment for the RHCs. The RHCs' international divisions are undoubtedly under a great deal of pressure to produce positive results since returns were less than stellar in 1989.

The internationalization of the RHCs ultimately will bring them new market and revenue opportunities and new learning experiences that will benefit ratepayers, shareholders and the American public. ■

Leslie A. Taylor is a Telecommunications Consultant in Bethesda, Md. She recently completed the book *The RHCs: International Ventures, Strategies and Opportunities* for Phillips Publishing Co.

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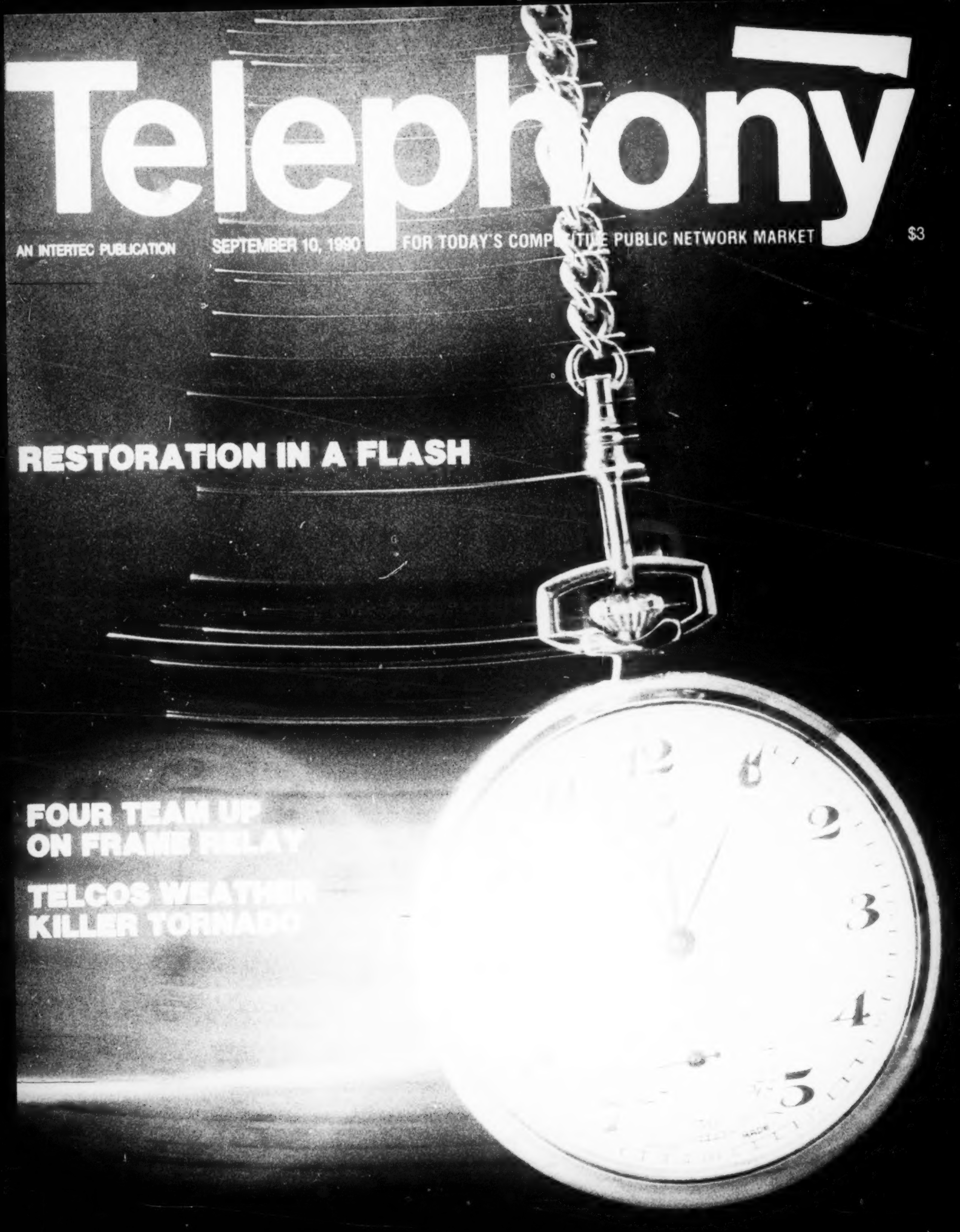


RESTORATION IN A FLASH

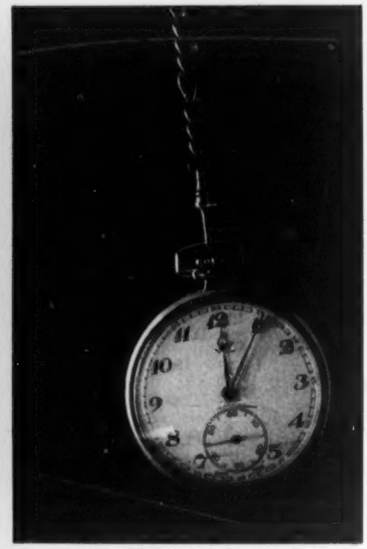
FOUR TEAM UP ON FRAME RELAY

TELCOS WEATHER KILLER TORNADO

MONDAY, SEPTEMBER 10, 1990 Volume 219, No. 12

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET



It only takes 1.5 seconds after a DS3 channel fails for damage to set in at a local office. But DS3 cross-connects can be called on to quickly detect the culprit and modify network connections, thereby minimizing damage. Cover art by Don Sparks, The Image Bank

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TELEPHONY (ISSN 0040-2656) is published weekly for $45.00 one year, $70.00 two years. Outside U.S. $80.00 one year. Air mail for $186.00 for U.S.; $225.00 for Canada. Air Express one year outside U.S. and Canada for $150.00. Single copies $3.00 each (payable in advance); outside U.S. add $1.00. Subscription rates apply to employees of operating telephone companies; telephone consultants; contractors; interconnect companies; specialized common carriers; military; government; associations; private communications users; schools; libraries. Published by Intertec Publishing Corp., 9221 Quivira Rd., Overland Park, KS 66215. Second class postage paid at Chicago, IL and additional mailing offices. POSTMASTER: Send address changes to TELEPHONY, P.O. Box 12[illegible]0, Overland Park, KS 66212. Copyright 1990 by Telephony Division, Intertec Publishing Corp. All rights reserved. Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Telephony for libraries and other users registered with the Copyright Clearance Center provided that the fee of $1.50 per page is paid directly to CCC, 21 Congress St., Salem, MA 01970. Special requests should be addressed to publisher.

NEWS OF THE WEEK

8 FOUR VENDORS AGREE ON FRAME RELAY SPEC
Northern Telecom, DEC, StrataCom and cisco Systems sign a pact to support a frame relay interface for public and private networks

8 MFJ RELIEF NIXED IN 1990
A congressional staffer says there's no chance for legislation by the end of the year

9 TELCOS RESPOND IN WAKE OF TORNADO
Illinois Bell and cellular carriers aid in disaster recovery after a twister hits Chicago suburbs

9 QUESTIONS PERSIST IN NYNEX RATE CASE
New York PSC releases a list of 33 vendors whose employees attended the Nynex "pervert conventions"

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By Robert J. Pekarske. It only takes 1.5 seconds for an outage on a span of DS3 channels to disable a local office. DS3 cross-connects can help reduce outage time

41 THE PLAIN TRUTH ABOUT ISDN
By Charles Foskett. Though skeptics may question ISDN's worth right now, there's really no question that it will change the way we work in the 21st century

The plain truth about ISDN

ISDN may not be the messiah some optimists claim it to be, but it definitely will change the way we work and live in the 21st century

CHARLES FOSKETT

Pessimists claim that ISDN is the acronym for "I simply don't know." Optimists claim that the integrated services digital network is the solution to all modern communications problems and that it will be a revolutionary force that will affect the way we work, communicate and live in the next century. Skeptics argue that facilities and services provided by ISDN are already available from other sources at a lower cost.

Realists know that the truth lies somewhere in between.

To understand how and why ISDN will succeed in the years to come requires an understanding of the general forces driving ISDN development and the specific needs it fills. Such understanding also requires familiarity with available ISDN platforms, the range of ISDN products and a knowledge of how products and services can be distributed.

The Communication Revolution

Several major economic forces are driving the communications revolution. First, deregulation has spurred creativity and entrepreneurship in U.S. telecommunications. Hundreds of telcos and third-party providers compete for consumers' attention, with access to every level of the network.

Such open market competition will continue to make services affordable for more people and create incentives for companies to develop service enhancements and new products.

The second major force is demographic. The American work force is shrinking and becoming increasingly segmented—by age, skills and training, and vocational interest. The dwindling labor force is a net result of the "graying" of the American population.

The emergence of single-parent and working-couple families has changed family buying patterns. Working family members have no time or energy to shop, which has led to a surge in mail-order and telephone-based buying. This situation has created a need for innovative, telephone-based order-entry and order-fulfillment processes, which has heightened demand for customer premises equipment and network time.

For businesses, increased travel costs have sparked interest in cost-efficient conferencing and document transfer. On a wider scale, the globalization of the market economy has stimulated demand for global communications. The skyrocketing use of facsimile machines and a growing reliance on voice links and electronic mail testifies to this need.

Although economic forces have created the climate for change, they cannot create specific product demand. ISDN products must meet specific market needs.

First, ISDN must provide voice, data and image integration on the same connection. The technology must allow voice communication and the simultaneous ability to transfer files and screens from workstation to workstation or from workstation to host.

Second, ISDN loops must permit local station access to network data such as calling party name and number and to other local or remote information systems operating from mainframe hosts or local area networks. Third, besides providing standard electron-

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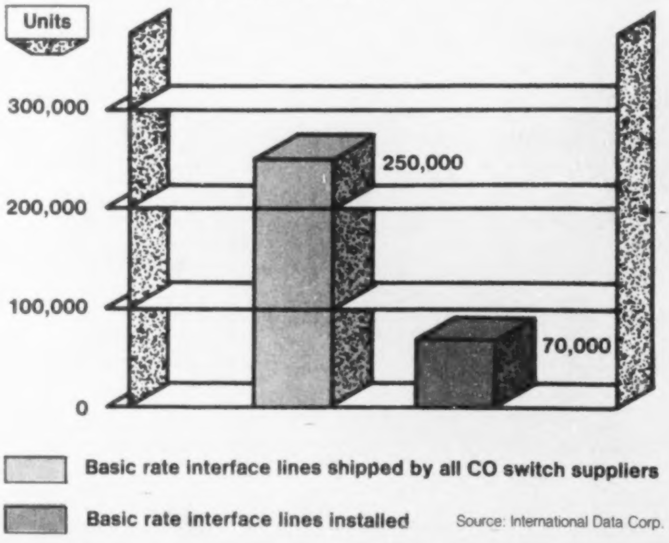
FIGURE 1 ISDN LINES SHIPPED OR INSTALLED (YEAR-END 1989)



Source: International Data Corp.

dows would provide the additional advantage of offering voice, data and telephony control while simultaneously executing any word processing, spreadsheet or database application.

The Desktop

ISDN capability can translate into improved performance for an office worker. With an ISDN-compatible workstation, a manager can first listen to voice-mail messages from Europe phoned in overnight. As the manager sits down to work on a spreadsheet, an incoming call alert flashes on a small window on the PC screen.

After checking the caller's number, the manager can choose to answer the call or let it bounce to a voice mailbox. During a conversation, the manager can send files to the caller. If there are any questions about the files, a conference call can be set up with additional participants.

If the manager has to leave the office early, the workstation can be programmed to deliver a prerecorded voice message and accompanying charts to 15 people in overseas offices that evening.

The technology for such applications is already on the market, although a complete ISDN infrastructure has not yet been developed. Figure 1 shows the number of ISDN lines shipped or installed by the end of last year. In April, NCR became the first major PC vendor to introduce an ISDN workstation, while other vendors such as Vadis Corp., ICI and Hayes plan to announce or have announced ISDN personal computer terminal adapters.

Of course, ISDN cannot work as envisioned unless a true network emerges. In the past two years, some PBX manufacturers, communications providers and CPE vendors have offered switch and network ISDN capability. As this trend continues, the value of ISDN services will increase geometrically. The availability of equipment and network connectivity of platforms are indispensable to the demonstration of ISDN's cost efficiencies and its value to users.

Just as essential is the rapid endorsement of ISDN equipment distribution organizations. Installers, system suppliers and service networks must move further up the learning curve to better understand and promote ISDN capabilities.

The Benefits

Desktop ISDN will profoundly alter the structure of many industry segments. New automated communications capabilities will increase worker productivity and revenues for businesses and individuals involved in order entry, financial transactions and information distribution, as well as provide a sorely needed service for customers.

A great deal of work remains to be done before ISDN turns pessimists and skeptics into optimistic and enthusiastic supporters. But manufacturers that can rapidly market equipment to simplify multimedia communications will be the long-term winners. T

Charles Foskett is President of Natural MicroSystems Corp., Natick, Mass.

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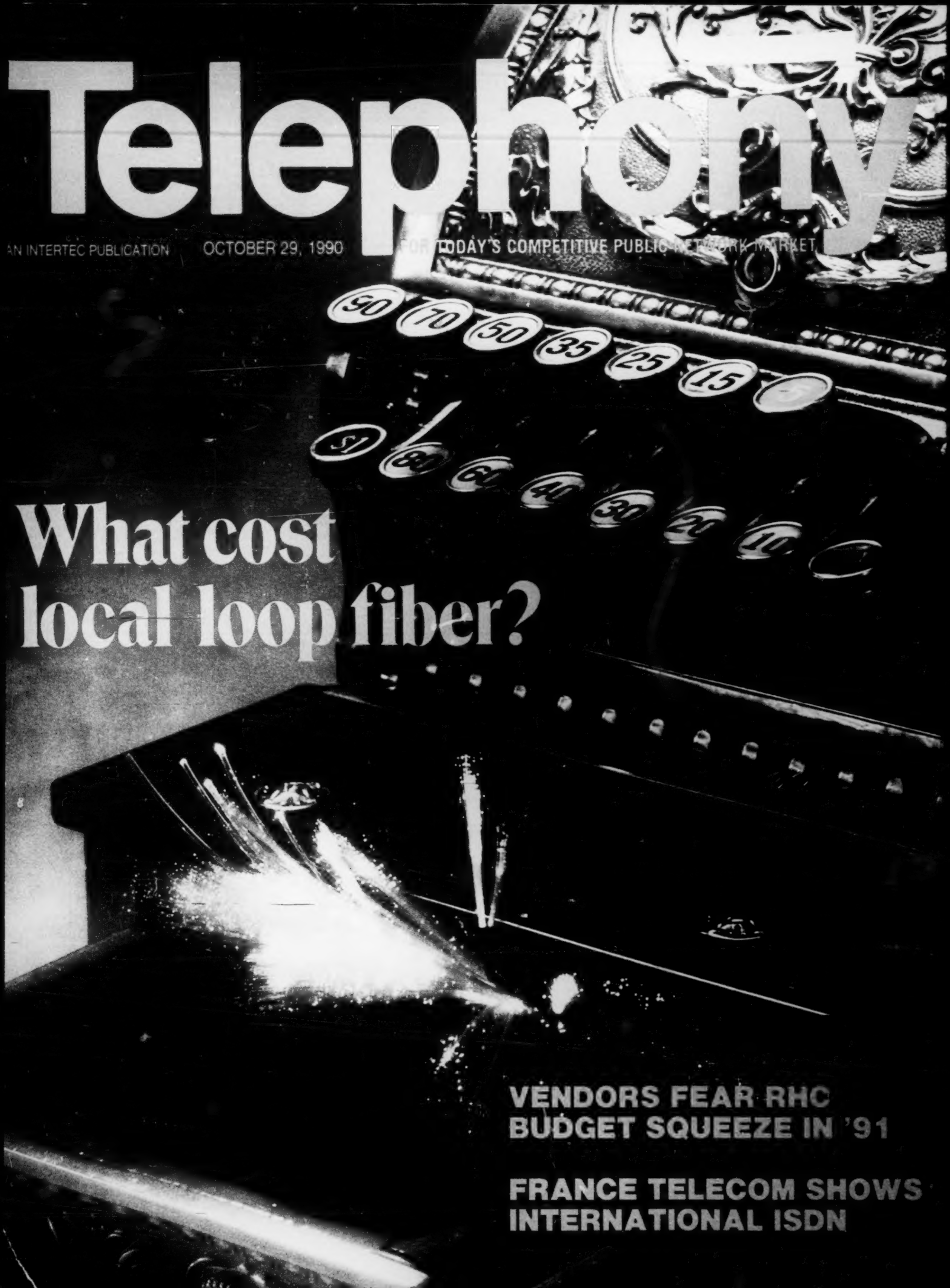
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What cost local loop fiber?

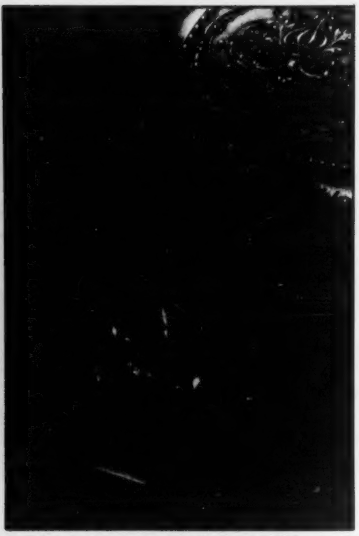
VENDORS FEAR RHC BUDGET SQUEEZE IN '91

FRANCE TELECOM SHOWS INTERNATIONAL ISDN

MONDAY, OCTOBER 29, 1990 Volume 219, No. 19

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET



Telcos can't automatically ring up fiber use in the local loop yet, but that time seems to be getting closer and closer.
Cover photo by Kenji Kerins

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But the carrier chooses bypass carrier Teleport for stateside service delivery

9 COURT WANTS TARIFF 12 REVIEWED
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that there are certain constraints about this business of ours—competition or no competition. There are certain core values and expectations that we've built and maintained over the years. We can't allow some employees to bend or break them." T

ISDN ventures overseas again

Richard Karpinski
Assistant Editor

France Telecom and a group of U.S. carriers teamed up at the Communications Managers Association trade show in New York last week to demonstrate full, end-to-end integrated services digital network connectivity between France and the United States.

However, unlike previous globe-spanning ISDN demonstrations—such as a recent collaboration between Pacific Bell, Illinois Bell and a pair of Japanese carriers *(Telephony, Sept. 3, page 9)*—the stateside local loop was handled not by a Bell company, but by an alternative access carrier, Teleport Communications.

Teleport's switched-services subsidiary, TC Systems Inc., supplied the local basic rate interface (2B+D) connectivity in New York via two 5ESS switches, which the company purchased earlier this year. France Telecom supplied ISDN connectivity in France and an AT&T transAtlantic cable linked the two local loops.

"I don't even consider . . . Teleport a bypasser because there isn't an ISDN service to bypass. It doesn't exist," said Gabriel Sidhom, France Telecom's director of marketing.

For Teleport, the demonstration was a preview to the carrier's commercial international ISDN, said Bill Baldwin, general manager of TC Systems. In early 1991, the company will roll out the service commercially beginning with a controlled introduction with an undisclosed Manhattan bank, Baldwin said. Initially, the bank will use the service to link up with France Telecom and British Telecom. Later, the service will be expanded to an additional European country and a Far East location, Baldwin added.

"We feel there is a growing and unmet demand for ISDN services," Baldwin said. "Not for island-type service, but for long-haul and, especially, international ISDN services."

New York Telephone filed its ISDN tariff on Oct. 17. When approved, the company initially will offer the service in several exchanges in Manhattan, a company spokesman said.

By working with an alternative carrier, France Telecom hoped to spur the Bell operating companies to move more quickly on ISDN, France Telecom's Sidhom said. ISDN is ubiquitous in France Telecom's network, and the carrier has 150,000 subscribers running more than 40 different applications, he said.

"We've run into a wall bringing ISDN to the U.S., because its not in the local loop," he said. "[The demonstration] is an inducement to other carriers."

Perhaps as early as this week, France Telecom plans to announce international ISDN links with additional U.S carriers, including some BOCs, Sidhom added.

The CMA demonstration showed the potential for international ISDN. The link was used to present a desktop conferencing application developed by ICL, which allows real-time simultaneous reviewing and editing of documents, data, images and graphs. In addition, the carriers had an ISDN videoconference running on PictureTel equipment.

Real-life applications are important for the future of ISDN, Baldwin said. "Customers don't buy ISDN services, they buy applications." T

Court rejects AT&T Tariff 12

Charles Mason
Washington Editor

AT&T's aggressive moves to capture major corporate customers for customized services under its Tariff 12 hit a legal snag last week when a federal court threw the tariff back to the Federal Communications Commission for a new look.

The U.S. Court of Appeals, acting on a challenge filed by MCI and US Sprint, told the FCC to properly justify its decision approving Tariff 12. Specifically, the court wants the FCC to explain how customized offerings are different from generally available services and how price differences can be justified. Under the Communications Act of 1934, AT&T is supposed to offer identical services to all customers at the same price. Competitors claim that the offerings violate this restriction.

Although the decision casts an air of uncertainty over the future of AT&T's customized offerings, the court recognized that AT&T does have the right to compete and the FCC still can have its say on the issue.

"We have the impression that there is a certain air of unreality about this case," the court said. "The FCC, one way or

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THIRD-QUARTER REVENUE RESULTS OF THE RHCs AND GTE
(In millions of U.S. dollars)

	Three months ended Sept. 30		Nine months ended Sept. 30	
	1990	**1989**	**1990**	**1989**
Ameritech	$2668.7	$2554.3	$7968.0	$7607.9
Bell Atlantic	3098.7	2909.4	9192.8	8559.9
BellSouth	3551.1	3545.0	10,695.1	10,381.1
Nynex	3395.1	3308.9	10,164.1	9842.8
Pacific Telesis	2468.0	2368.0	7275.0	7118.0
Southwestern Bell	2367.7	2208.7	6666.6	6406.8
U S West	2482.6	2323.0	7319.5	7151.2
GTE	4600.0	4400.0	13,600.0	12,800.0

THIRD-QUARTER INCOME RESULTS OF THE RHCs AND GTE
(In millions of U.S. dollars)

	Three months ended Sept. 30		Nine months ended Sept. 30	
	1990	**1989**	**1990**	**1989**
Ameritech	$311.2	$289.1	$967.0	$906.5
Bell Atlantic	358.4	344.1	1076.5	1016.6
BellSouth	402.9	404.4	1271.3	1272.1
Nynex	296.7	288.7	888.7	851.3
Pacific Telesis	285.0	278.0	834.0	920.0
Southwestern Bell	323.6	295.3	833.9	795.6
U S West	302.6	258.1	850.9	766.3
GTE	409.0	388.0	1100.0	1000.0